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STATE OF MONTANA
NATURAL RESOURCE DAMAGE PROGRAM

MONTANA POLE TREATMENT PLANT
GROUNDWATER INJURY ASSESSMENT
BUTTE, MONTANA

APRIL 1993

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BUTTE GROUNDWATER INJURY ASSESSMENT REPORT

UPPER CLARK FORK RIVER BASIN

STATE OF MONTANA
NATURAL RESOURCE DAMAGE LITIGATION PROGRAM

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JANUARY 1995

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I am prepared to testify as to the appropriateness of the statistical methodologies used in the following reports and that the differences between groundwater conditions of the control and assessment areas, in each one of these reports, are statistically different under D.O.I. Regulation, 43 C.F.R. § 1172(h)(5):

1. *Anaconda Groundwater Injury Assessment Report, Deer Lodge Valley, Montana.* By William W. Woessner, Ph.D., January 1995.
2. *Milltown Groundwater Injury Assessment Report.* By William W. Woessner, Ph.D., January 1995.
3. *Rocker Groundwater Injury Assessment Report, Rocker, Montana.* By William W. Woessner, Ph.D., January 1995.
4. *Montana Pole Treatment Plant Ground Water Injury Assessment, Butte, Montana.* By John J. Metesh, Montana Bureau of Mines and Geology, April 1993.

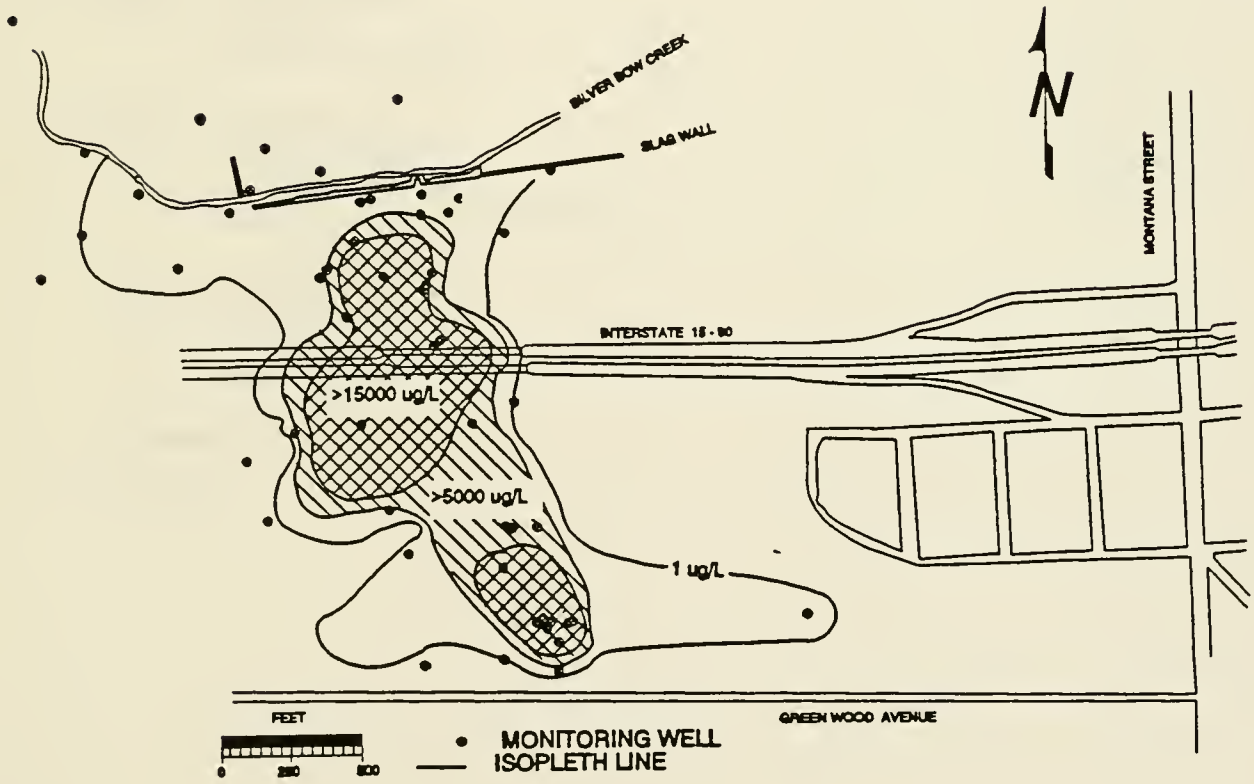
Richard J. Brand 1/10/95

Richard J. Brand, Ph.D.

CLARK FORK NATURAL RESOURCE DAMAGE ASSESSMENT - GROUND WATER

MONTANA POLE TREATMENT PLANT
GROUND WATER INJURY ASSESSMENT
BUTTE, MONTANA

JOHN J. METESH
MONTANA BUREAU OF MINES AND GEOLOGY
April, 1993



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1.0 INTRODUCTION

The Montana Pole Treatment Plant (a.k.a Montana Pole Plant, Montana Pole and Treatment Plant, Montana Pole) is located in the southwest portion of Butte, Montana (Figure 1).

The site is bounded on the north by Silver Bow Creek, on the south by Greenwood Avenue, on the east by a railroad right-of-way, and on the west by the western extent of the now defunct treatment and storage facility. The site is traversed east to west by Interstate 15 & 90. West of the site is Williamsburg, a small suburb of Butte and the Colorado Smelter site; a transformer storage yard owned and operated by the Montana Power Company and a heavy-equipment repair shop is located immediately east of the site. The Lower Area One (LAO) Operable Unit is located immediately north and northwest of the site.

Throughout the period of operation (1946-1984), organic contaminants, principally pentachlorophenol and diesel fuel, were released to the ground surface and eventually discharged to Silver Bow Creek by way of ground water and surface water. Contamination of soils and ground water is evident as free-phase product in wells in the area and along Silver Bow Creek.

1.1 Duration of Release / Site History

The wood-treating facility was first constructed in 1946 with production beginning in July; operations consisted of two butt-treating vats. Modifications in 1949 and 1956 included the addition of two retorts in which the Boulton process for wood treating was used. Timber was dried and pressure treated with a diesel / pentachlorophenol mixture (product). Boultonized water, condensed steam, and free product were discharged to ditches directed toward Silver Bow Creek. Catchment basins were apparently located downstream of the retorts; it is uncertain as to whether or not they were lined or had sumps.

An explosion and fire occurred on May 5, 1969 which destroyed a treatment vat, a boiler room, and a retort building. An unknown volume of product and water was released from the treatment vat, two retorts, broken pipes, and valves as a result of this fire. Although no monitoring wells were

MONTANA POLE TREATMENT PLANT

SITE LOCATION

(SOURCE BASE MAP: USGS TOPOGRAPHIC SHEET)

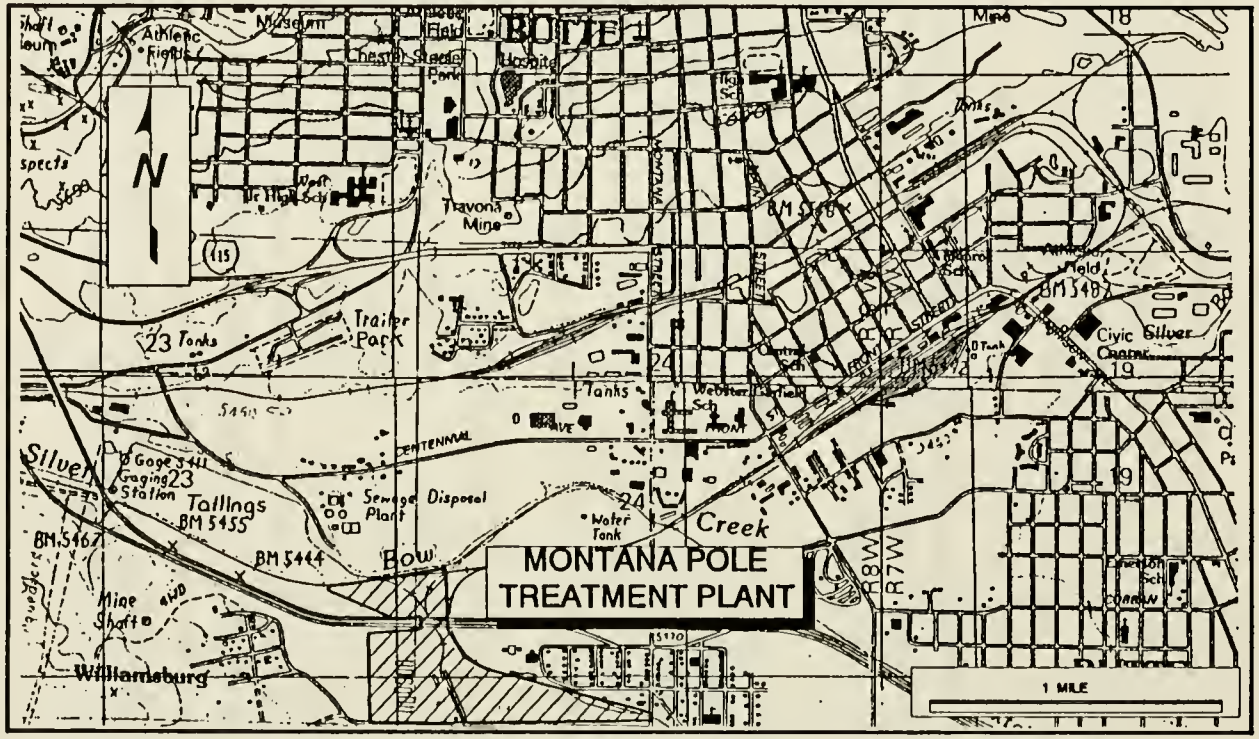


FIGURE 1. Location of the Montana Pole site (cross-hatch area) southwest of the city of Butte, Montana

present, two domestic supply wells were apparently contaminated and their use discontinued. The facility was reconstructed and back in operation by December 1969. A saw-mill was added to the operation in 1979 and a "closed loop" process water system installed in 1980. All operations at the site were discontinued on May 17, 1984 (KER 1991). The site was added to the U.S. EPA list of Superfund sites in 1986.

Contaminated water and free-product was released to the ground-surface at the site throughout the period of operation. In the immediate vicinity of the treatment facility where most of the contaminants were released, depth to ground water is approximately 16 feet below ground surface. Depending on soil conditions, the free-product would likely have reached the water table within a few months. Thus, the initial release of contaminants to ground water is nearly coincident with the release of product to the ground surface. The release of contaminants to ground water is continuing as free-phase product is, at present, observed in several monitoring wells and trenches throughout the site and is released to Silver Bow Creek from seeps along the stream bank.

1.2 Ground Water / Product Recovery System

The ground-water / product recovery system was installed in 1985. The system consisted of two recovery (north system and south system) trenches oriented roughly perpendicular to the ground-water flow direction (Figure 2). These trenches are approximately 8 to 10 feet deep and extend below the ground-water level. Each buried trench is filled with coarse gravel and lined on the down-gradient site with two recovery wells installed near each end. The pumps fill from the top so as to capture floating product. At specific time intervals, the pumps are automatically pressurized and a water/product mixture is pumped to an oil/water separator where the free-product is skimmed to storage tanks and the water re-injected into the ground by means of an infiltration gallery. Each of the two recovery systems, north and south, has two recovery pumps, an oil/water separator, and an infiltration gallery. Due to high ground water and subsequent flooding of the north system infiltration gallery in the spring of the year, a lift station was installed near the north

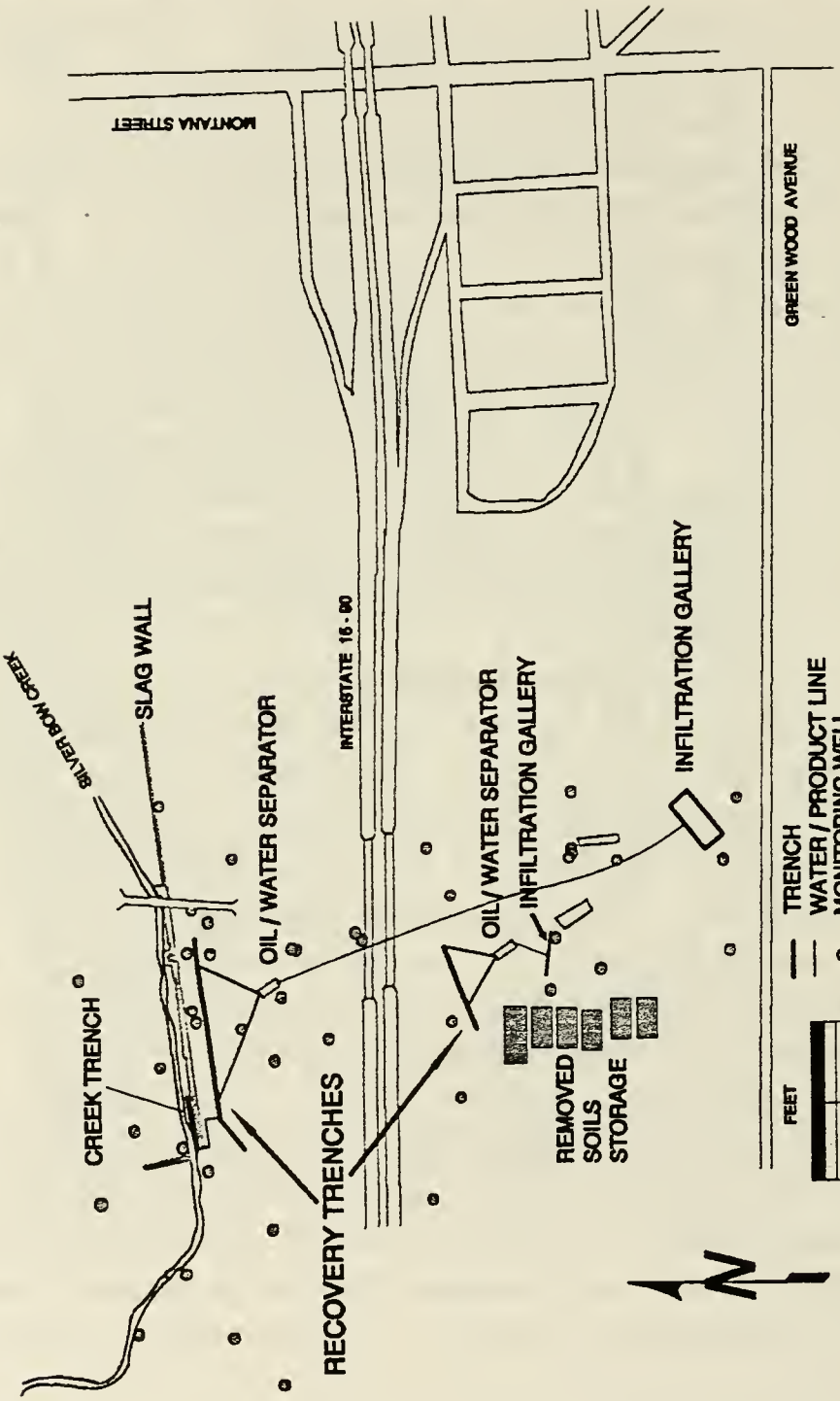


FIGURE 2
MONTANA POLE TREATMENT SITE
RECOVERY SYSTEM

separator to facilitate pumping to the southeast infiltration gallery. The lift station and gallery were installed in 1988.

Numerous seeps of product occur along a 600 foot stretch of Silver Bow Creek. Prior to initial removal activities in 1985, product was observed to be bubbling up from the creek bottom. To counter this, a third trench installed in 1985 is located adjacent to Silver Bow Creek in an area where product seepage from the bank to the stream was heaviest. This system consists of a centrifugal pump designed to lower the water table and draw product into the trench. Product thickness is monitored and skimmed as needed to the north separator.

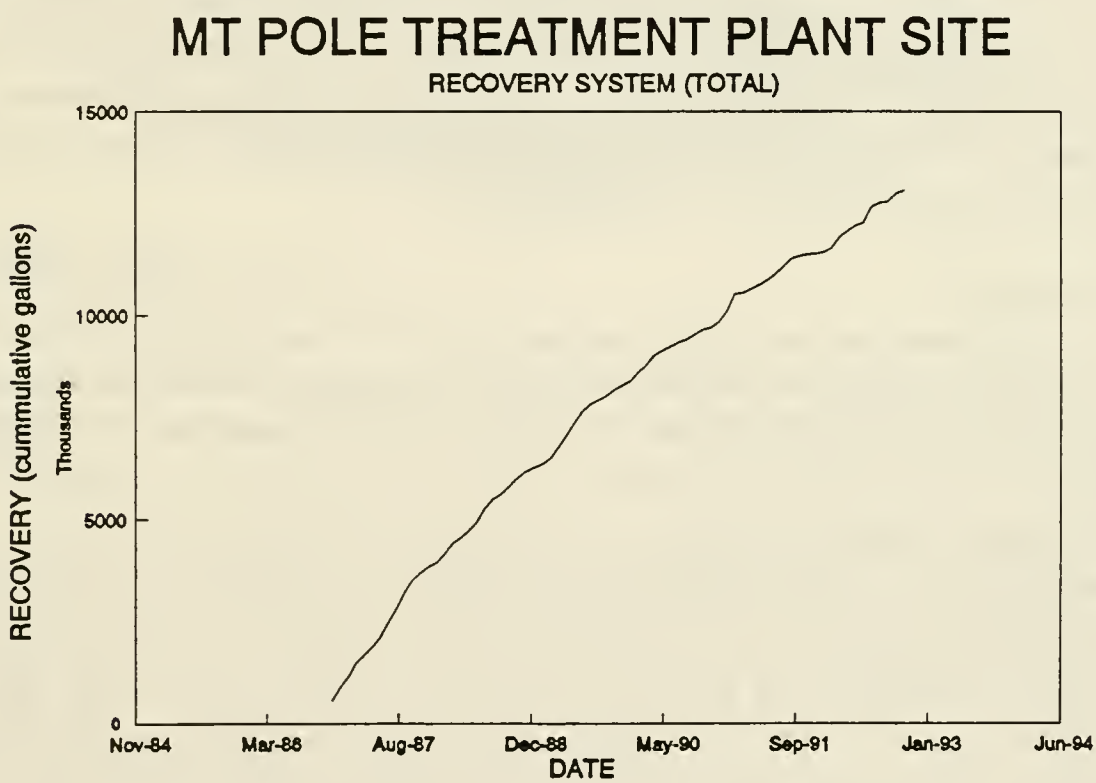


Figure 3. Cumulative volume of product recovered from ground water at the Montana Pole site.

Each of the four recovery pumps discharge an average of 2.5 gallons per minute; the centrifugal pump discharges approximately 10 to 15 gallons per minute. The total system discharge is approximately 20 to 25 gallons per minute. Total product recovery since 1985 is approximately 13,000 gallons; approximately 84% of which has been recovered from the south recovery system. The long term average is approximately 150 gallons recovered per month; however, it should be noted that the product recovery rate has decreased throughout the period (Figure 3). All recovered product as well as all material and equipment used in the collection of product is stored on site.

In October of 1992, the U.S. EPA began field operations of a Time Critical Removal Action (TCRA). In this action, the existing recovery system will be replaced by a ground water / product recovery system that will utilize a water treatment facility. Pumping wells rather than trenches will be used to recover ground water and product for treatment. The treated water will ultimately be discharged to Silver Bow Creek rather than injected up-gradient as with the existing recovery system.

1.3 Geology

The Butte area is in the southern portion of the Boulder Batholith in southwest Montana. The Boulder Batholith in the Butte area is chiefly Butte Quartz Monzonite which has been intruded by aplite, pegmatite, and grano-aplite. The Montana Pole Treatment Plant site is located on the edge of the Butte mining district which is a complex, highly-mineralized porphyry. Mineralization in the bedrock beneath the site is limited to a small amount of sulfides (chiefly pyrite and chalcopyrite) encountered at the bedrock-alluvium contact in the northwest portion of the site. Bedrock surface topology is controlled by preferential erosion along joints and fractures. The depth to bedrock beneath the site is variable and ranges from approximately 11 feet to 47 feet. A remnant erosional trough is evident in both the bedrock and surface topography (Figure 4).

The site is within the Butte valley which is comprised of alluvium and colluvium of Quaternary and Tertiary age. These sediments have been derived from the high mountains to the east and south as well as the smaller hills

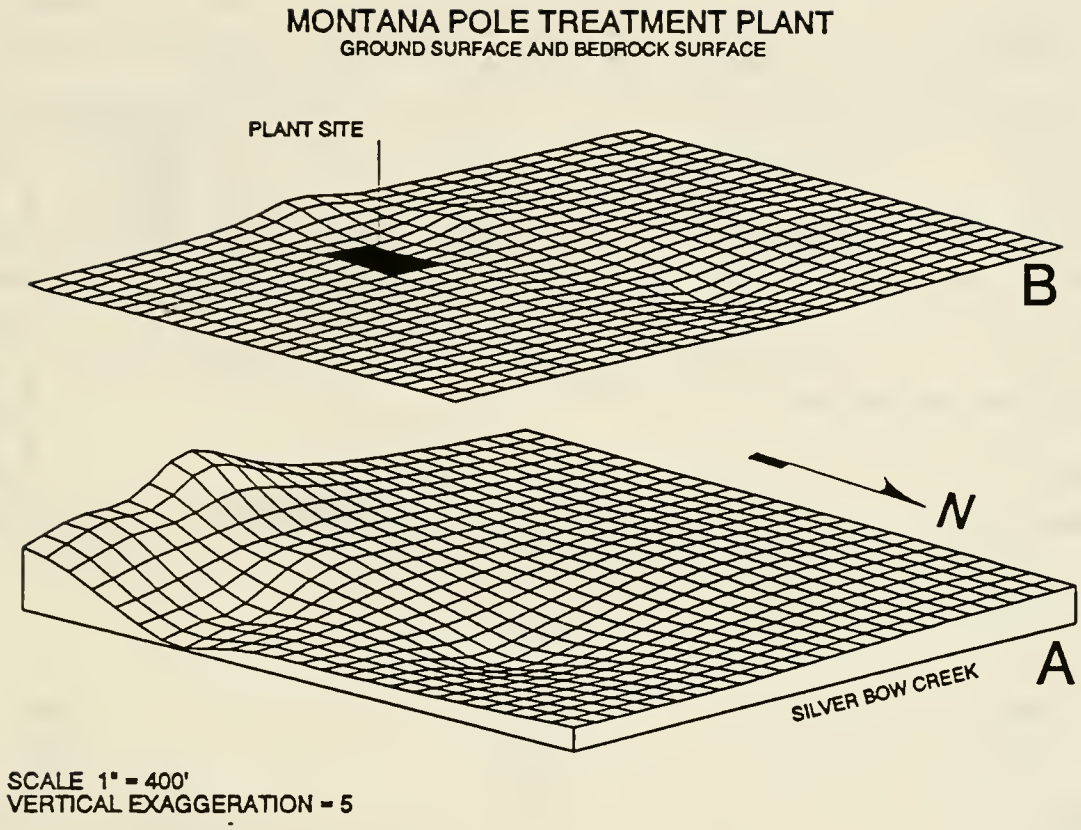


Figure 4. Bedrock (A) and surface (B) topography of the Montana Pole Treatment Plant site. Cultural features such as railroad beds have been excluded.

north and west. The site is located on the southern portion of a wetlands area that has been filled in by tailings and other material such as old building material and refuse. Based on subsurface lithology, it appears that the southern portion of the site was historically a small ephemeral stream which deposited sediments onto the wetlands area.

In general, the alluvium underlying the site is composed of silty sand and gravels interbedded with sandy clay. Subsurface borings in the northern portion of the site as well as north and west of the site indicate an aerially extensive bed of clayey peat (0.5 - 1 foot thick) associated with the wetlands. A north-south and east-west cross-section across the site are

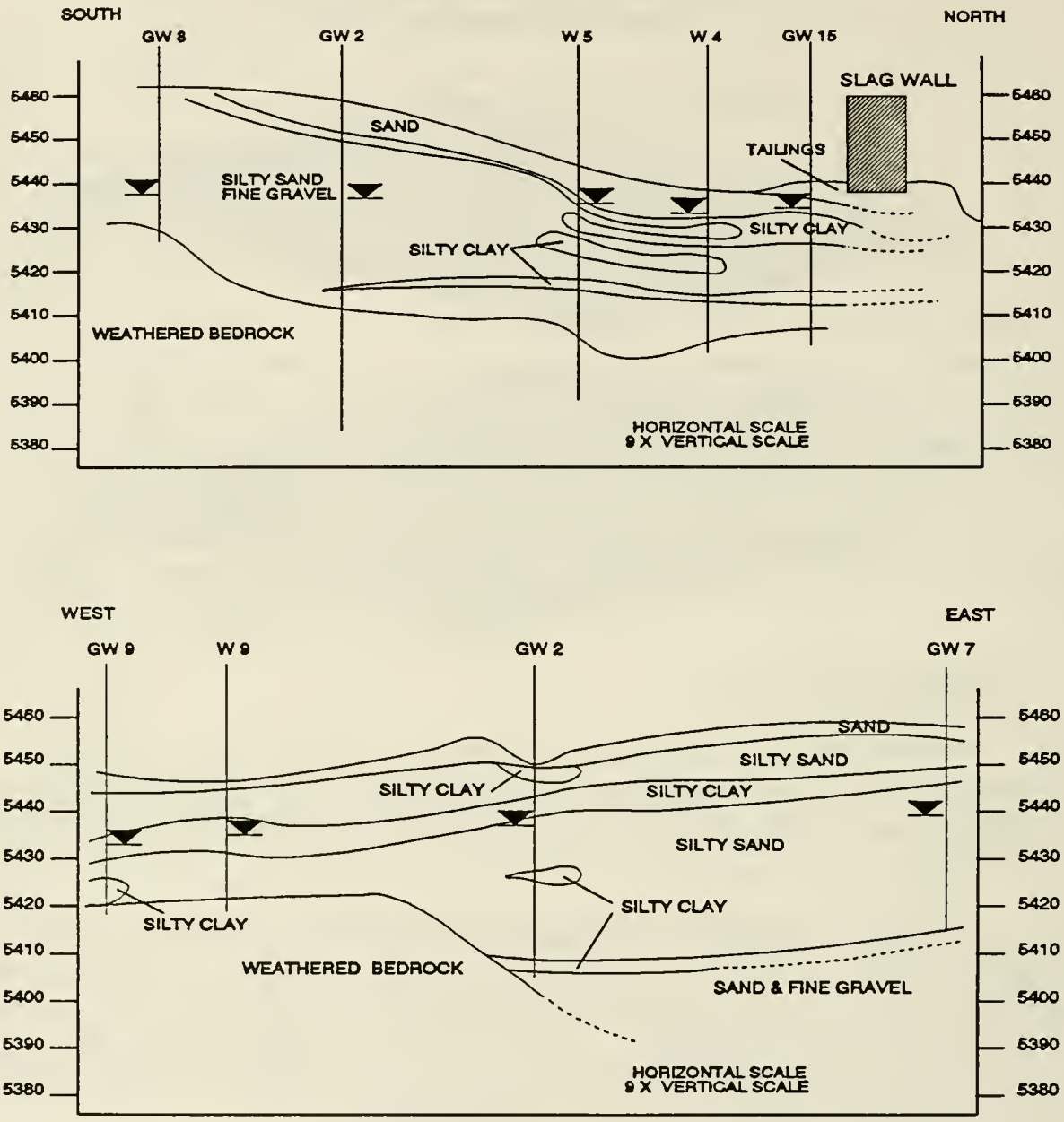


Figure 5 North-south and east-west cross sections of the Montana Pole Treatment site (After KER, 1991). Water levels at each well is indicated by a symbol. Well locations are presented in Figure 6.

presented in Figure 5. Other features evident from the correlation well logs both in northern portion of the Montana Pole Treatment Plant site and in LAO include overbank deposits (silts and clays) and channel sands associated with the Silver Bow Creek floodplain.

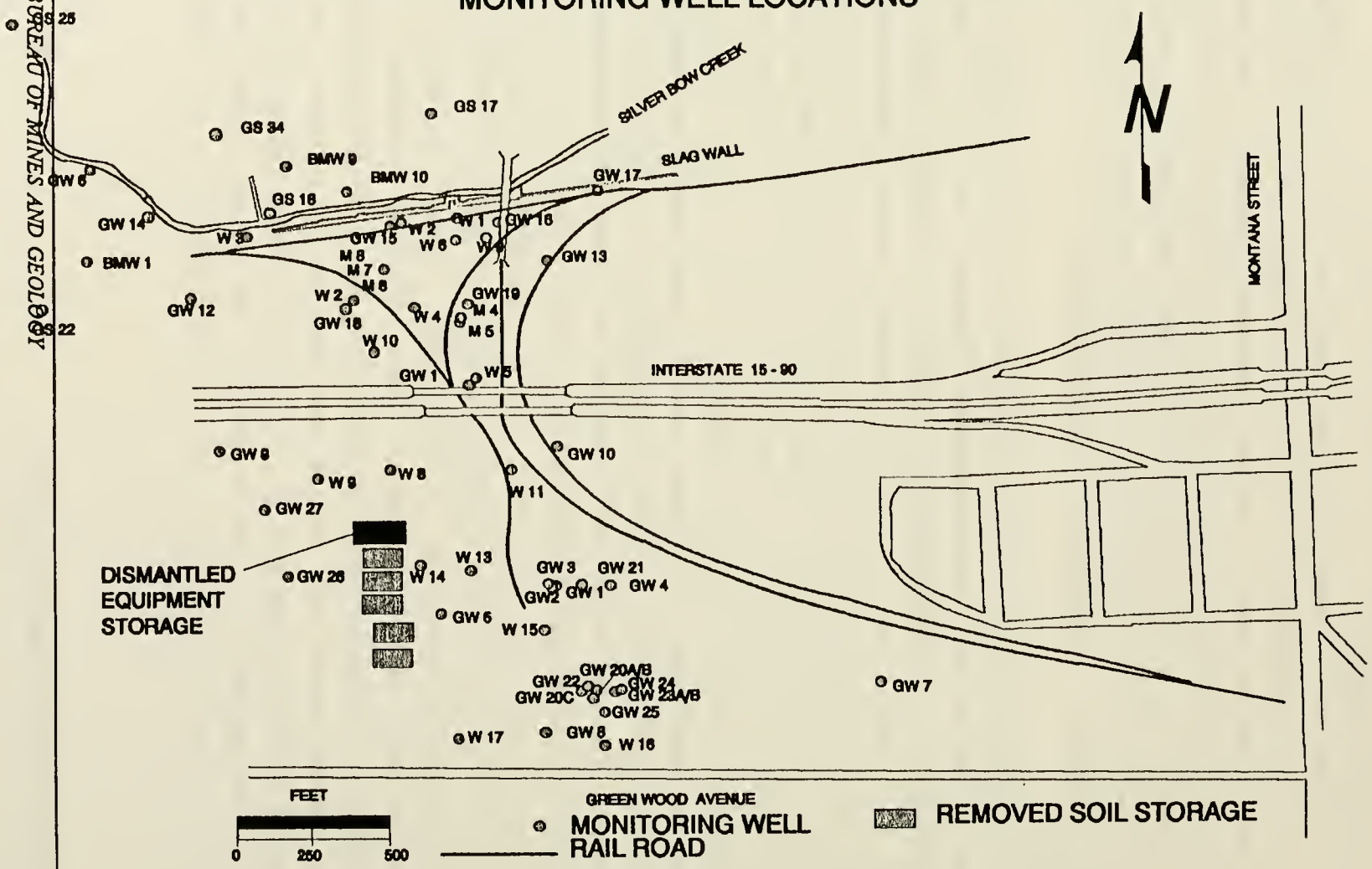
2.0 PHYSICAL AND HYDROLOGIC CHARACTERISTICS

2.1 Bedrock Aquifer

Ground water occurs in both the bedrock and the alluvium throughout the Butte area. Ground-water flow through the bedrock aquifer in the Butte area occurs in four pathways: 1) joints 2) discrete fractures 3) the fractured matrix, and 4) underground mine openings. With regard to the Montana Pole Treatment Plant, only the first three pathways apply as there are no known mine openings in the immediate area. Hydraulic conductivity values for the bedrock aquifer on the Butte hill range from 6E-5 cm/s to 3.4E-4 cm/s (Metesh, 1990).

Excluding wells installed in the LAO, 47 monitoring wells have been installed on or around the Montana Pole Treatment Plant site (Figure 6). Of these, only three wells have been completed in the bedrock aquifer (Wells GW2, GW18, and GW19). Thus, the extent of vertical hydraulic connection between the bedrock aquifer and the alluvial aquifer beneath the site is uncertain. In other areas of the Butte valley, vertical connection between the two aquifers is controlled by the presence of a clay-grus which may act as a low-hydraulic conductivity, confining layer. The grus is a result of in-situ, physical weathering of the quartz monzonite resulting in an accumulation of coarse grained fragments. Chemical weathering of the fragments in the presence of ground water, which tends to form clays, is accelerated by the increased surface area. Fractures and joints collapse or are in-filled and a clayey, granular zone is formed on top of the bedrock. Transport of the weathering product occurs in some areas and is a source of the clays and silts encountered in the alluvium. In other areas, however, no transport occurs and a hydraulically confining layer is formed. Based on observations made during drilling at the Montana Pole Treatment Plant site, the Montana Power Company transformer storage yard, and the Lower Area One Operable Unit, the clay-grus appears continuous over most of the area and is often greater than 10 feet thick. An exception is noted, however, at the west of the Colorado Tailings portion of LAO where the clay-grus has been eroded or has not formed.

FIGURE 6
MONTANA POLE TREATMENT SITE
MONITORING WELL LOCATIONS



2.2 Alluvial Aquifer

As indicated in the cross-sections (Figure 5), the silty clay layers are likely to act as aquitards (strata of low hydraulic conductivity) or aquicludes (strata of negligible hydraulic conductivity). However, numerous excavations for pipelines, plant activities, site investigations, and the ground-water / product collection system have disturbed the upper portion of the aquifer. Thus, the confining nature of these units is probably restricted to local extent (tens of feet).

Ground-water flow in the alluvial aquifer is generally from southeast to northwest toward Silver Bow Creek (Figure 7). Water levels fluctuate approximately five to seven feet annually and depth to water ranges from approximately 5 to 20 feet below surface. Localized flow patterns influenced by the variable lithology are likely, but not strongly evident. The influence of the existing recovery system is also small. On average, a total of 20 to 25 gallons per minute is the maximum amount discharged by the total system. Thus, drawdown near the recovery trenches is minimal. A slight mounding effect is observed near the infiltration galleries and amounts to 1 foot or less above normal ground-water level. The equipotential lines in Figure 7 were constructed using SURFER (1989) and water-level data collected by the MBMG in August of 1992.

The alluvial aquifer extends beneath the entire area of the site, with the exception of one area. Well 17, southwest of the plant site, has been dry throughout most of the period of record. All other wells on or near the site indicate a saturated zone throughout the period of record. The only hydrogeologic boundary near the site is Silver Bow Creek on the northern boundary. The creek is the discharge area for the local aquifer.

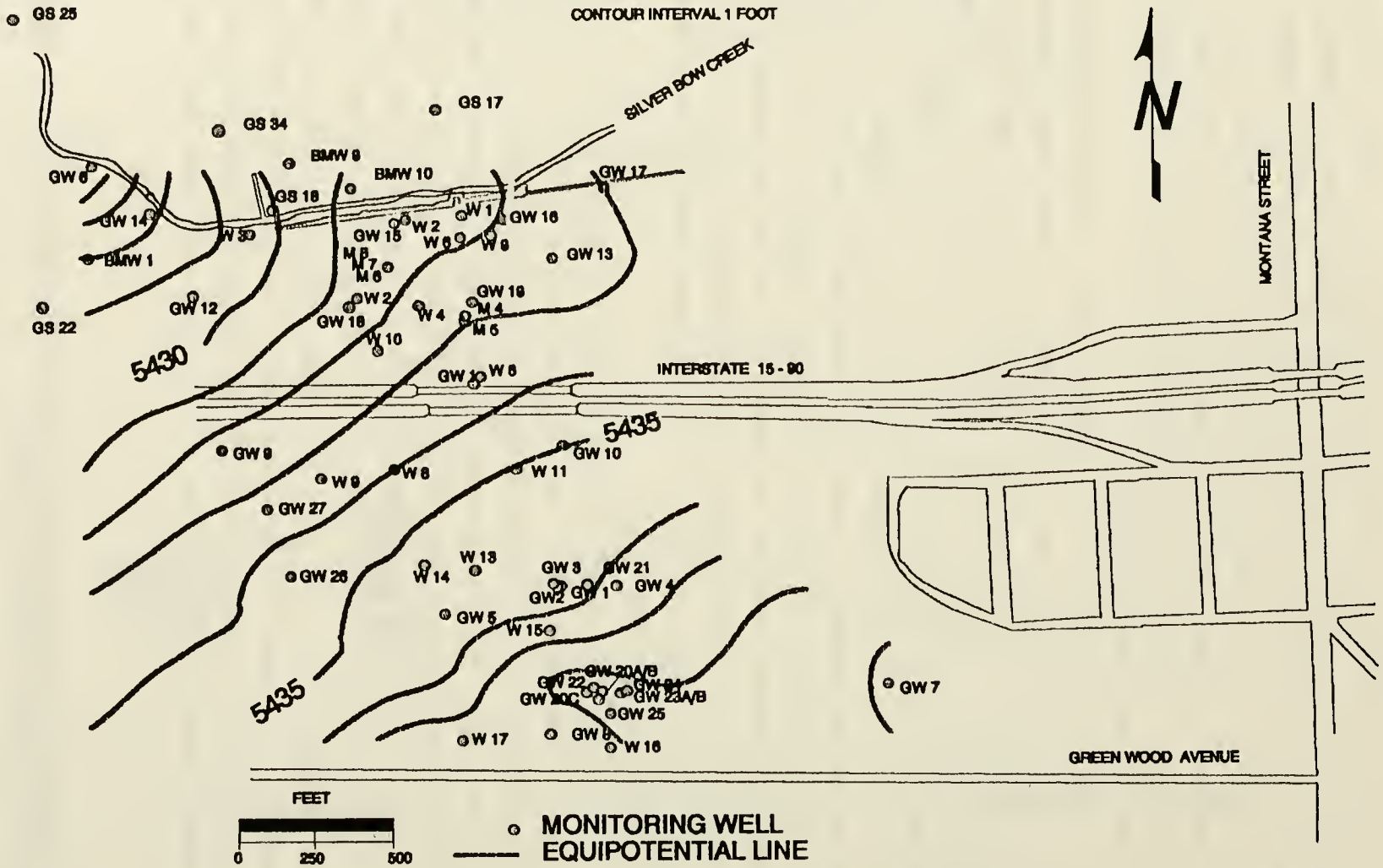
The average alluvial ground-water elevation on the site is approximately 5435 feet above mean sea level and range from 5440 to 5425 over the period of record. The average hydraulic gradient is approximately 0.006 ft/ft toward the northwest. Based on data collected during the Remedial Investigation, the average hydraulic conductivity is 5.7E-3 cm/s and range from 4.2E-2 cm/s to 3.8E-5 cm/s (KER, 1991).

FIGURE 7

MONTANA POLE TREATMENT SITE

WATER LEVELS AUGUST, 1992 (MBMG Data)

CONTOUR INTERVAL 1 FOOT



Data collected from well nests on the site indicate a general downward hydraulic gradient. Nested wells GW1-GW2, M4-M5, M7-M8, and M7-M6 all exhibit consistently downward gradients in the alluvial aquifer. Exceptions do occur on occasion with some well nests, depending on the time of year. In these instances, such as with the M7-M8 well nest, an upward gradient is observed.

Moore (1989) conducted column tests to determine porosity and retentive properties of the alluvial material on the site by using material and product collected from the site. Data collected by Moore from four test sites indicated 7 to 11 percent gravel, 9 to 20 percent silt and clay, and 71 to 81 percent sand. Moore determined that the porosity of the product-saturated layers ranged from 28 to 37 percent with an average of 32 percent.

Moore reported that approximately 43 percent of the product in the alluvial material is retained against gravity. Approximately 26 percent more of the product was yielded by the material after addition of water to the top of the column. Thus, based on these data, approximately 69 percent of the free-phase product released to the ground surface is available for transport as free product or for dissolution into ground water.

3.0 GROUND WATER INJURY DETERMINATION

3.1 Contaminant Sources

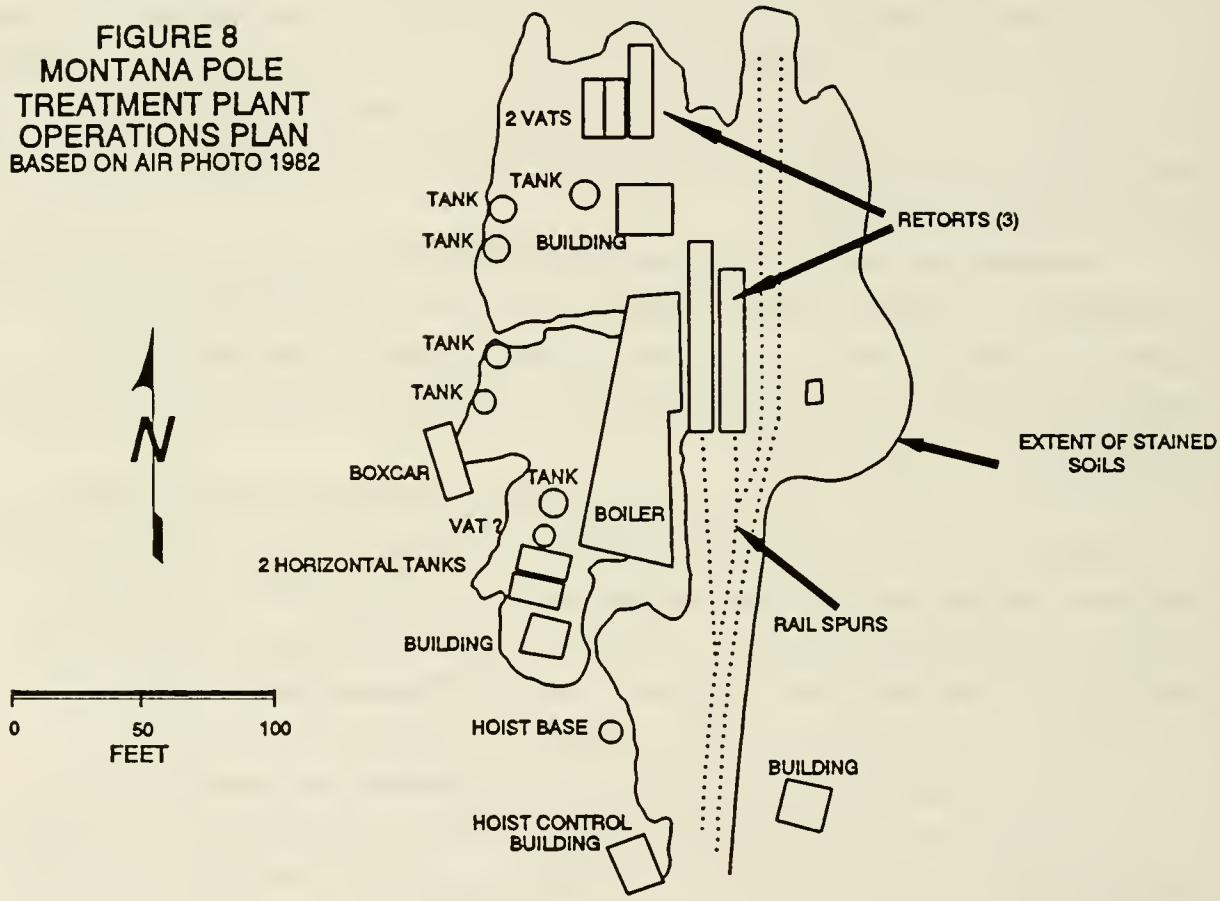
The primary source areas of soil contamination at the Montana Pole Treatment Plant site are the spill areas, associated with the treatment plant operations and the fire in 1969, and the discharge stream for the Boultonized water emanating from the retorts. The free-phase product and contaminated water migrate downward to the water table. As the oil-like product is lighter than water, most of it remains floating on the water-table. Pentachlorophenol and other organic contaminants are then released into the ground water by dissolution of the product. The result is a co-existing plume of product and dissolved organic compounds.

Secondary sources of ground-water contamination include the zone between the highest and lowest seasonal ground-water level. Floating product is repeatedly smeared over this interval as water-levels fluctuate thereby creating conditions that enhance the mass transfer of PCP and other organic contaminants to ground water.

Figure 8 presents the operations plan of the Montana Pole Treatment Plant based on a color aerial photograph dated 7/25/82. The largest building contained the boilers used for the generation of steam and heat for the retorts in the Boulton process. The various tanks were used to store, mix, and recharge the PCP/Diesel mixture. The vats located next to the north retort were constructed of a large storage tank that was cut in half.

Areas of heaviest soil staining by the product were those near the retorts and the rail line leading to the retort. Soil stained by the product was apparent at least as far north of the plant as the interstate overpass in the area of the trench extending from the plant to Silver Bow Creek. This trench apparently contained the free-product released as a result of the fire in 1969 as well as the discharge water from the normal operations. Slight staining of the soils in the eastern pole-storage yard was also evident. Although no stained soils were evident, there were several stacks of treated timber southwest of the plant adjacent to Greenwood Avenue as well as west of

FIGURE 8
MONTANA POLE
TREATMENT PLANT
OPERATIONS PLAN
BASED ON AIR PHOTO 1982



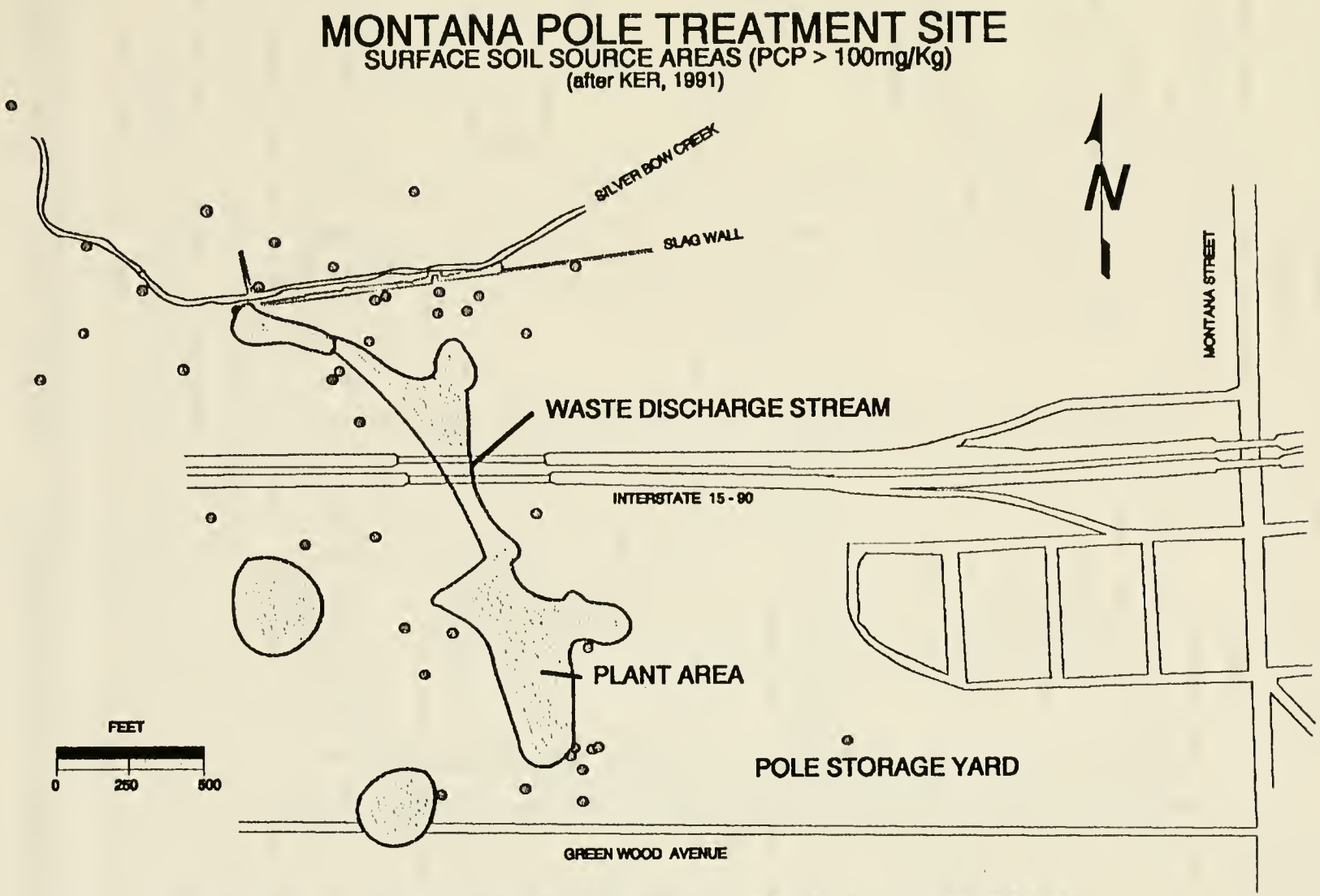


FIGURE 9. Potential source areas of ground-water contamination based on concentrations of PCP in surface soils.

the plant. Figure 9 presents possible source areas based on concentrations of PCP in soils as measured by KER (1991, 1992). The location of a discharge stream from the plant to Silver Bow Creek is also included.

Data from the Remedial Investigation indicates other source areas which may be considered as secondary. Surface soil sampling grids were established over the pole storage areas west and east of the treatment facilities. Evidence of PCP in soils in the western area was found in four locations while 27 sample locations in the eastern storage area indicated the presence of PCP. Data from other soil sample locations within the plant area and north of the plant area indicated the presence of PCP as well as other organic constituents. Although some locations were in or near the discharge trench, others were located in areas where surface water ponding occurred. Seventeen "opportunistic" samples were collected and PCP was detected in all samples. Nine of the seventeen samples indicated the presence of #4 fuel oil (diesel) while other hydrocarbons were not detected.

As previously described, contamination of ground water occurs in two phases: the free-phase product "floating" on top of the ground-water and the dissolved phase in varying concentrations throughout the alluvial aquifer beneath the site. The free-phase product ranges in thickness from approximately 3 feet to an oil sheen in several monitoring wells on site. The thickness of product in a given well varies with time. The Montana Bureau of Mines and Geology (MBMG) has been monitoring water levels and product-thickness on a monthly basis since 1986. Over this period of record, wells have indicated an increase in product thickness from zero to several inches while product-thickness in other wells have decreased to zero. Product-thickness in wells appears to be responsive to recharge events and often reflects seasonal fluctuations (Figure 10). Wells that have had measurable product within the period of record are: W-3, W-6, W-8, W-15, W-5, W-13, W-10, W-4, M-6, M-7, M-8, and W-2. Other monitoring wells have been completed in zones where free-product was encountered during drilling but show no indication of free-product in the well. These wells include GW-3, GW-16, and GW-14. It should be noted that product thickness in a well is generally greater than the product thickness in the aquifer (Farr, Houghtalen, and

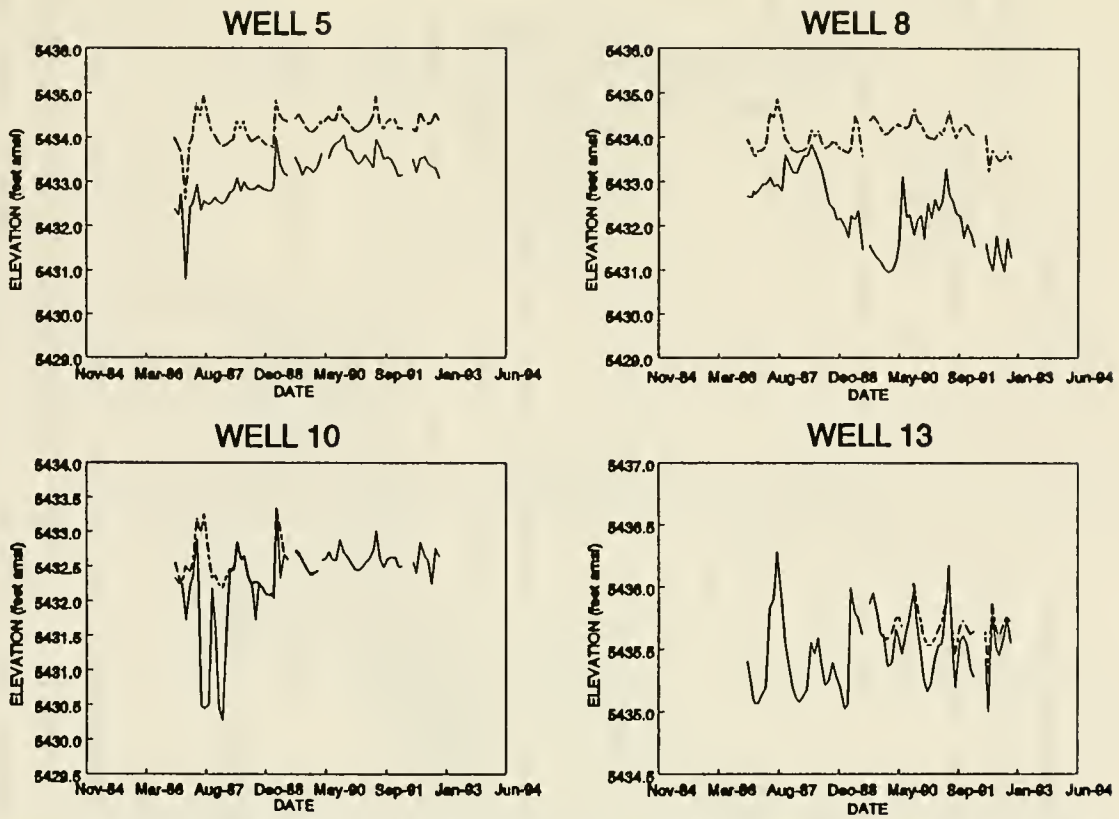


FIGURE 10. Product levels (dashed lines) and water levels (solid lines) for wells in the central portion of the site.

McWhorter, 1990). Although methods for a more precise determination have been postulated, it is assumed that the well/aquifer product thickness is 4:1. Monthly water level and product level data collected by MBMG are presented in Appendix I.

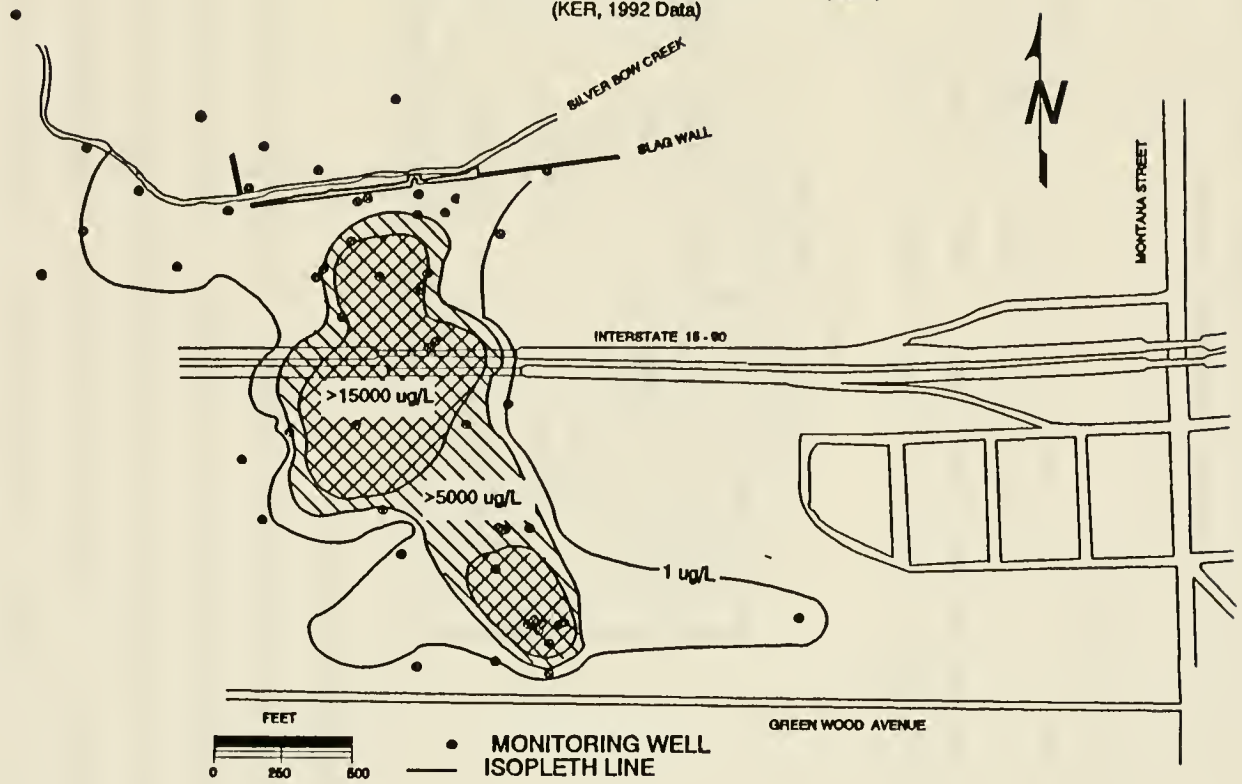
3.2 Identity of Contaminants

Pentachlorophenol, as well as all 12 of the acid-extractable phenols were detected in the majority of the on-site monitoring wells. PCP contamination of the ground water is by far the most extensive, both laterally and vertically, of all the dissolved organic constituents found on the site. A map of concentration of PCP in ground water is presented in Figure 11. PAHs (Polynuclear Aromatic Hydrocarbons), associated with petroleum products, were detected in many of the monitoring wells on the site. Elevated PAHs concentrations are often coincident with the presence of the free-phase product. BTEX (benzene, toluene, ethylbenzene, and xylene) was detected in all 33 on-site monitoring wells sampled. As with the PAHs, concentrations were highest in wells with measurable free-phase product. The dominant hydrocarbon of the six considered was #4 fuel oil or diesel fuel. 2-methylnapthalene, naphthalene, and phenanthrene were also detected in ground water; however, the occurrence of these constituents was limited to only a few samples.

Dioxins (2,3,7,8 TCDD) and furans (TCDF and TCDF congeners) as well as pesticides (specifically Aldrin and 4,4-DDT) were detected in oils and sludges as well as oil recovered from the oil/water separators. Dioxins and furans were also detected in the ground-water samples collected from wells W-2 and W-11. No other ground-water samples were analyzed for these constituents.

Pentachlorophenol is the most widespread contaminant encountered at the site. When detected, the occurrence of the other organic constituents described was always coincidental with the occurrence of PCP. Ground water samples collected from an up-gradient well located in Mount Moriah Cemetery indicated no PCP or any other organic constituents related to Montana Pole.

FIGURE 11
MONTANA POLE TREATMENT SITE
PENTACHLOROPHENOL ISOPLETH (ug/L)
(KER, 1992 Data)



Wood preservatives used at the treatment plant apparently did not include those containing trace metals. Although elevated concentrations of metals were detected in wells near Silver Bow Creek, it is not likely that they are associated with the treatment process used on this site, but rather with mining and related activities in the area.

3.3 Relevant Standards

An injury to ground water from the release of a hazardous substance is defined, in part, as concentrations in excess of Safe Drinking Water Act (SDWA) maximum contaminant levels (MCL). SDWA standards for contaminants of concern at the Montana Pole site are presented in Table 1.

Table 1
Relevant Standards
For Montana Pole Treatment Site

Constituent	MCL (Rev)
Pentachlorophenol	1 ug/L
Benzene	5 ug/L
Toluene	1000 ug/L
Ethylbenzene	700 ug/L
Xylene	10000 ug/L

3.4 Acceptance Criteria

Injury to ground-water resources is determined by measurement of concentrations of a hazardous substance or constituent caused by the release of a hazardous substance in two ground-water samples from the same hydrogeologic unit at least 100 feet apart. These measurements must be taken from either two properly constructed wells, a well and a spring or seep, or two springs and a seep. Ground water samples for Montana Pole were obtained from a number of wells and seeps sufficient to meet these criteria.

Analytical data for samples collected by KER (1991, 1992) during the Remedial Investigation is presented in the Appendix II. Measurement of concentration of the contaminant of concern were obtained during several sampling events. The most recent were those obtained by ARCO's contractor Keystone Environmental Resources (KER) during the 1990/1991 Remedial Investigation.

4.0 PATHWAY DETERMINATION

The primary source for ground-water contamination is the free-phase product that has migrated down through the unsaturated material as a result of direct discharge to the surface during plant operations. The ground water is then contaminated through dissolution of PCP and other hazardous substances. this dissolution is enhanced by seasonal ground water fluctuations of 1 to 2 feet which increase the contact area between the ground water and the free-product. In most cases, water levels are lowest during the winter months when recharge to the ground water is minimal. It is during this period that the amount of alluvium at or near saturation by free-product is greatest because the product is "smeared" downward. Upon spring recharge resulting from snow-melt and rain, ground-water levels rise and the smeared product is inundated by ground water. The result is more free-product available for dissolution into the ground water.

The dissolved-contaminant pathway is similar to that of ground-water flow. As discussed in Section 2.2 of this report, there is a slight downward ground-water flow gradient throughout the site. As a result, PCP and other contaminants of concern have been detected at depth and in areas where there is no evidence of free-product. Attenuation of organic constituents is dependent on the characteristics of the aquifer material as well as the characteristics of the ground water. Concentrations of PCP in ground water at the site are often lower than the equilibrium value. This difference in concentration is attributable to the physical and chemical processes that limits the mass transfer from the free-phase product to the ground water. Similarly, the chemical and physical characteristics of the media control the

mass transfer of the dissolved organic compounds to the sediments of which the aquifer is comprised.

4.1 Mobility

PCP is moderately soluble in water: 1 to 1000 mg/L (AQUIRE Database, U.S. EPA) but has a tendency to adsorb to soils and stream sediments. Adsorption to oxidized sediment is higher but is strongly pH dependent. In general, adsorption is stronger in low-pH conditions (Howard, 1991) and is strongly influenced by the organic carbon content of the soil and the ionic strength of the ground water (Schellenberg, 1984). Stordahl (1993) (Appendix III) presents mass transfer and solubility data for product and ground water at the Montana Pole site.

Pentachlorophenol is of a group of hydrophobic weak acids with an octanol/water partition coefficient of 5.24 and a pK_a of 5.25 (Schellenberg and others, 1984). There are two primary factors that affect the mobility of pentachlorophenol, as well as other organic contaminants: the physical relationship of the contact between the product and ground water, and the relationship between the dissolved organic constituents and the aquifer material.

Dissolution of PCP and other organic constituents into ground water occurs under two conditions. The first is in the region between the "pure-oil" phase and the "pure-water" phase where natural capillary action serves to dramatically increase the surface area of the oil/water contact (Mohanty, 1987). Thus, the rate of dissolution is controlled, in part, by the magnitude of this enlarged surface area.

The second condition controlling the contact between the product and the ground water occurs with ground-water fluctuations. As the phreatic water surface rises in response to natural recharge or pumping, oil becomes trapped in pore spaces due to the retentive nature of the aquifer material. The presence of the trapped oil can greatly enhance dissolution of organic constituents into ground water depending on the grain size distribution of the aquifer material (Powers, 1992).

Once dissolved into ground water, PCP and other organic constituents are immediately subject to sorption by the aquifer material. This is the second controlling factor for transport. In natural waters of low-ionic strength, overall sorption is dominated by the partitioning between the aqueous-phase and the organic-phase concentration in the aquifer material. The sorption of PCP is strongly dependent on the organic content of the aquifer material which can range from less than 1 percent (Schellenberg, 1984) to 2 percent (Lindsay, 1979). Sorption is also controlled, but by a lesser degree by pH, temperature, and ionic strength (Schellenberg, 1984).

The grain-size of the alluvial material beneath the Montana Pole site ranges from sand to clay. Thus, the oil/water contact surface area and, as a result, the rate of dissolution of PCP and other organic contaminants is likely to be quite variable. Similarly, ground water levels fluctuate 1-2 feet seasonally, and thus, the presence of entrapped product in pore spaces below the average water level is almost certain. Based on laboratory experiments using both product and ground water from the Montana Pole site, a concentration of PCP in ground water of approximately 140 mg/L is possible (Stordahl 1993, Appendix III). The concentration of 140 mg/L represents the

concentration of PCP immediately adjacent to the oil/water interface prior to transport or sorption by the aquifer material.

The result of these factors is reflected in the concentration contours in Figure 11. The concentration of PCP in the product used at the site was approximately 50,000 ppm (Byrne and Wittenhagen, 1986) and was reported as 42,900 ppm in Well 8 by KER (1991). While PCP concentrations in ground water approaches saturation beneath the free-phase product plume, concentrations decrease rapidly with distance away from the free-phase plume as a result of sorption by organic carbon in the aquifer material. PCP concentrations remain above 1 ppb for 10s to 100s of feet, however; reflective of the exceedence of the sorption capacity of the aquifer material. Further migration of the free-phase product plume will, in turn, promote continued migration of the dissolved plume.

4.2 Rate of Transport

Bear (1987) defines the apparent velocity of a contaminant through a porous medium as V/R_d, where V is the average water velocity and can be defined as:

$$V=\frac{KI}{n}$$

V : Average ground-water velocity

K : Saturated hydraulic conductivity

I : Hydraulic gradient

n : Porosity

Based on an average hydraulic conductivity of 16 feet per day (5.7E-03 cm/s) as reported by KER (1991), and average hydraulic gradient of 0.006 from Figure 7, and an effective porosity of 32% (Moore, 1989), an average velocity of 0.3 feet per day (110 feet/year) is obtained.

R_d is the retardation coefficient and is further defined by Bear as:

$$R_d = 1 + \frac{(1-n)\,\rho_s K_d}{n}$$

where:
n: porosity
ρ: solid density
K_d: distribution coefficient

Similarly, Lee (1991) defines R_d as:

$$R_d = (1 + \rho\ \frac{K_d}{\theta})$$

where, θ = volumetric moisture content

The moisture content is equivalent to porosity under saturated conditions.

R_d in both equations is strongly dependent on the distribution coefficient or sorption coefficient, K_d. K_d is, in turn, dependent on such factors as pH, ionic strength, co-solvency, and organic carbon content of the water and soil. Section 7 of this report will expand on the discussion of dissolution of Pentachlorophenol in water in terms of mass-transfer rates and the effects of the forementioned factors. In terms of transport of PCP-laden ground water, the primary factor affecting K_d is organic carbon content (Lee, 1990).

The average organic carbon content of soils at the Montana Pole site is approximately 0.16 percent (KER, 1991). Lee (1990) conducted experiments

using PCP in soils of various organic carbon content. In particular, a soil with an organic carbon content of 0.22 percent and comprised of material similar to that of the Montana Pole site yielded a K_d value of 1.94 mL/g. The ionic-strength of the water used was also similar to that of the Montana Pole site; 0.015 (Lee, 1990) versus 0.026 (see Stordahl, Appendix III).

Using a value of 32% (0.32) for porosity, 2.65 g/cm^3 (typical value) for solid density, and a K_d value of 1.94 mL/g, the Bear equation yields an R_d value of 12.04 and the Lee equation yields a value of 17.23. When these values are used in the apparent-velocity equation (V/R_d), the dissolved-PCP migration rate is 9.2 and 6.4 feet per year, respectively.

5.0 BASELINE CONDITIONS

5.1 Bedrock Aquifer

Three wells, GW-3, GW-18, and GW-19, were completed in the bedrock aquifer as part of the Remedial Investigation (KER, 1992). Pentachlorophenol concentration in GW-3 was as reported as 2.88 ppb and BTEX was reported as 3.32 ppb while concentrations of other organic constituents were below detection limit. It should be noted that GW-3 is mis-identified in the KER 1992 report. GW-3 is nested with two other wells completed in shallow alluvium and deep alluvium. The vertical gradient in the immediate area of these wells is variable; both upward and downward gradients have been observed between the deep alluvium and the bedrock well. Ground-water level response to recharge is similar in all three wells indicative of at least some hydraulic communication between the two aquifers.

The bedrock well, GW3, was sampled only once in two rounds of sampling. Further, the concentration of pentachlorophenol in wells GW-18 and GW-19, down-gradient of the plant area and GW-3, was below the detection limit of 1 ppb. Thus, no definitive plume can be defined. The data suggests limited impact to the bedrock aquifer and does not preclude the possibility of contamination during well installation or sampling.

5.2 Alluvial Aquifer

As part of the Remedial Investigation conducted by KER (1991, 1992), several wells located up-gradient and away from the site were sampled and analyzed for the contaminants of concern. These wells include the water

supply wells in the Mount Moriah Cemetery approximately 1200 feet south east of the site and the Bontempo well 3500 feet west of the site in Williamsburg.

Since the principal contaminants of concern (PCP, PAHs, and BTEX) were synthetically derived and have not been associated with any other industrial sources in the area of Montana Pole, baseline concentrations can be considered zero for both the bedrock and the alluvial aquifers. KER reported that none of these hazardous substances were detected in either the Bontemp or Mount Moriah wells.

The Mount Moriah and Bontempo wells were selected as background wells in the remedial investigation and this assessment. These wells are the closest to the site in areas where there is no industrial or commercial activity. The Mount Moriah well is situated up-gradient of the contaminant plume; both wells are completed in the alluvial aquifer.

5.3 Concentration of Contaminants

Concentrations of organic constituents for ground water sampled at the site are listed in the Appendix II. The data is reported here without the laboratory or validation qualifiers. These data were collected and presented in the Preliminary Draft Remedial Investigation Report (KER, 1991) and the Draft Remedial Investigation Report (KER, 1992) by Keystone Environmental Resources, Inc. for ARCO.

6.0 EXTENT OF INJURED GROUND WATER

6.1 Areal Extent

The exceedence of MCLs at the Montana Pole Treatment Plant site is dominated by pentachlorophenol. The total area bounded by the 1 ppb PCP isopleth and Silver Bow Creek (Figure 11) is approximately 1,930,000 square feet (44 acres). The isopleth map was constructed using SURFER (Golden Software, Inc., 1989) and was modified to restrict the zero concentration isopleth (not shown).

6.2 Volume

The vertical extent of contamination was again based on pentachlorophenol concentrations from wells completed at depth. With few exceptions, PCP concentrations were above 1 ppb throughout the alluvium beneath the area implied in Figure 11. Using an average depth to water of 12 feet below ground surface (MBMG data, Appendix I) and, based on data presented in Table 2, an average depth to bedrock of 35 feet below ground surface (KER data, 1991, 1992), the saturated thickness is 23 feet.

Table 2
Depth to Bedrock
(Keystone, 1991, 1992)

WELL	DEPTH TO BEDROCK (feet below g.s.)	WELL	DEPTH TO BEDROCK (feet below g.s.)
GW3	42	GW14	29
GW4	47	GW15	31.5
GW6	19	GW16	29.5
GW5	35	GW18	30
GW8	29	GW19	33
GW9	27	GW20C	35
GW10	39	GW21	45
GW12	30	GW22	35
GW11	45	GW23B	45
GW13	37	GW26	27
M1	34	GW27	28
M4	37		
M6	35		

Direct measurement of the capillary rise of water in the unsaturated zone has never been conducted on the site. Moore (1989), however, conducted a capillary column experiment using material from the site. The capillary rise was measured as approximately 1.4 feet. This amount of rise corresponds to a silty sand which agrees with lithologic descriptions from well logs at the site. The areal extent of contamination in the unsaturated zone is assumed to be the same as the areal extent of ground-water contamination (1,930,000 square feet).

The total volume of affected aquifer is 44,400,000 cubic feet. Assuming a porosity of 32% determined by Moore (1989), the total volume of injured ground water is 14,200,000 cubic feet (326 acre-feet). The total volume of

unsaturated material affected is 2,700,000 cubic feet and the total volume of injured vadose zone water, based on a 43 percent retention (Moore, 1989) is 1,160,000 cubic feet (26.67 acre-feet).

6.3 Ground-water Flux

The flux of ground water beneath the Montana Pole site can be calculated directly from site-specific data using Darcy's Law, Q=KAI, where K is the hydraulic conductivity (16 feet/day), I is the hydraulic gradient (0.006 ft/ft), and A is the cross-section area of the saturated thickness affected by contamination (27600 ft^2). A was determined by using a saturated thickness of 23 feet and an approximate average width of 1200 feet located near the middle portion of the PCP-contaminant plume. The ground water discharge beneath the site is 2650 ft^3/day (0.06 acre-ft/day; 22.2 acre-ft/year).

7.0 RECOVERABILITY

The total amount of product released to the ground surface is unknown. Approximately 21,000 gallons have been recovered from the subsurface to date. This amount includes product recovered during the initial removal action in 1985 (8,000 gallons) and product from the ground-water recovery system (13,000 gallons). An unknown amount has been released to Silver Bow Creek. As discussed in previous sections, at least 43 percent of that total amount will be retained in the soil. The product retained in the soil will be available for dissolution into the ground water until the source is depleted or removed.

As discussed in earlier sections, the transport of PCP in ground water is dependent on several conditions such as temperature, ionic strength, pH, and organic carbon content. In a similar way, these conditions also govern the rate at which PCP (and other organic compounds) is transferred from the oil phase (product) to the ground water at the interface. This rate is referred to as the mass-transfer rate. Stordahl (1993, Appendix III) conducted experiments using product and ground water from the Montana Pole site and was able to determine the mass-transfer rate of PCP from the product to the ground water and the oil/water interface. Since the mass-transfer rate is also dependent on the relative concentration of the oil and the water, Stordahl also presented rates for various PCP-in-water concentrations.

The mass transfer rate ranges from 109 mg/m^2*hr to 3 mg/m^2*hr. This range should represent the maximum and minimum PCP mass-transfer rates for the Montana Pole site. The maximum transfer rate occurs when the concentration of PCP in ground water is near zero while the minimum occurs when the concentration of PCP in ground water is near saturation. With respect to site

conditions, the maximum rate occurs in the up-gradient area of the LNAPL (Light Non-Aqueous Phase Liquid) plume as "fresh" ground water moves onto the site. As the ground water moves down gradient, mass transfer continues but decreases as the concentration of PCP in the ground water increases. On the down-gradient end of the plume, the mass transfer rate is at a minimum.

An approximation of the time required for the Montana Pole site to recover can be based on the time required to deplete the PCP contained in the product. A calculation summary is presented in Table 3. The maximum and minimum flux rates are used as well as the flux rate which represents conditions near the center of the plume where the concentration of PCP in the ground water is 10 mg/L or greater. The area of the LNAPL was determined from a map of such presented in the Draft Final Feasibility Study (JMMontgomery, 1993), the volume of product was estimated using a 1.5 foot product thickness reported by JMMontgomery (1993) and assumes a porosity of 32% as determined by Moore (1989). The mass of the product at the site was calculated by assuming a specific gravity of 0.96 (MBMG data) and a typical mass of water. The mass of the PCP was assumed to be 4% of the product mass. This value reflects concentrations found on the site (KER, 1992, 1992) and is slightly less than the 5% concentration released to the ground surface (Byrne, 1986).

The loading rates were calculated for the three conditions based on the assumption that the oil/water interface at the site is flat and occurs across individual pore spaces. This assumption leads to an under-estimation of loading since the actual oil/water interface is much larger. The capillary action of the oil and the water are quite different and the result is a much larger area where oil and water are in contact (Farr, 1990).

TABLE 3
CALCULATION SUMMARY
OF RECOVERY RATES

FLUX RATES (Stordahl, Appendix III)

MAX	109	mg/m^2*hr	2.23E-05	lb/ft^2*hr
MIN	3	mg/m^2*hr	6.13E-07	lb/ft^2*hr
@10mg/L	65	mg/m^2*hr	1.33E-05	lb/ft^2*hr

MASS OF PCP

Area of LNAPL plume	960000.00	ft^2
Volume (Area X 1.5ft X .32 [porosity])	460800.00	ft^3
Mass of Water (typical)	62.40	pcf
S.G. of Product	.96	
PCP content of product	0.04	
MASS OF PCP	1.10E+06	lb

LOADING RATES (Flux * Area * .32 [porosity])

MAX	6.84	lb/hr
MIN	0.19	lb/hr
@10mg/L	4.08	lb/hr

RECOVERY (Mass/Rate)

@MAX	18.42	years
@MIN	669.16	years
@10mg/L	30.88	years

The recovery time or time required to deplete the PCP in the product is was obtained by dividing the mass of PCP available for transfer by the flux rate. It should be noted that PCP concentration data was collected over a short period of time. Any changes in concentration of PCP in ground water or product at the site have not been determined. Thus, the values presented here are only representative of a brief period of time. It should be further noted that these values only represent the loading rate of PCP from the product to the ground water at the interface. As discussed in Section 4.2 of this

report, PCP is adsorbed by the aquifer material. Once the source of PCP in the product is depleted, PCP concentrations in the ground water at the oil/water interface will decrease. At the same time, this decrease in ground water-PCP concentration will lead to desorption of PCP from the soil to the ground water. In essence, one contaminant source is exchanged for another. The rate of recovery from PCP for the site, then, also depends on the amount sorbed by the soil and the rate at which it is desorbed once conditions allow for its occurrence. The cumulative recovery time will be the time required to deplete the product-PCP source, plus the time required to deplete the soil-PCP source. Thus, the total time required for complete recovery would be 100s to 1000s of years.

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APPENDIX I

WATER LEVEL AND PRODUCT LEVEL DATA
COLLECTED BY
THE MONTANA BUREAU OF MINES AND GEOLOGY

MONTANA POLE TREATMENT PLANT
MONTHLY PRODUCT LEVEL AND WATER LEVEL DATA
MONTANA BUREAU OF MINES AND GEOLOGY

DEPTH TO WATER

	WELL 1		WELL 2		WELL 3		WELL 4		WELL 5		WELL 5A		WELL 6	
		5435.14		5436.70		5438.13		5437.54		5441.64		5441.64		5438.06
22-Nov-86	5.82	5429.52	6.30	5431.40	7.03	5431.10	7.27	5430.27	9.25	5432.39		5441.64	7.22	5430.84
27-Dec-86	6.83	5429.31	5.53	5431.17	7.19	5430.94	7.19	5430.35	9.40	5432.24		5441.64	7.37	5430.69
10-Jan-87	5.86	5429.28	5.57	5431.13	7.26	5430.87	7.09	5430.45	8.92	5432.72		5441.64	7.46	5430.60
24-Jan-87	5.90	5429.24	5.59	5431.11	7.28	5430.85	7.20	5430.34	9.13	5432.51		5441.64	7.46	5430.60
21-Feb-87	5.73	5429.41	5.25	5431.45	7.15	5430.98	6.84	5430.70	10.86	5430.78		5441.64	7.36	5430.70
01-Apr-87	5.72	5429.42	5.39	5431.31	7.03	5431.10	7.00	5430.54	9.20	5432.44		5441.64	7.25	5430.81
25-Apr-87	5.63	5429.51	5.24	5431.46	6.89	5431.24	6.86	5430.68	9.14	5432.50		5441.64	7.11	5430.95
29-May-87	5.05	5430.09	4.40	5432.30	6.12	5432.01	6.13	5431.41	8.71	5432.93		5441.64	6.41	5431.65
29-Jun-87	5.49	5429.65	5.02	5431.68	6.78	5431.35	6.76	5430.78	9.29	5432.35		5441.64	7.00	5431.06
25-Jul-87	5.18	5429.96	4.75	5431.95	6.39	5431.74	6.58	5430.96	9.07	5432.57		5441.64	6.62	5431.44
01-Sep-87	5.79	5429.35	5.46	5431.24	6.71	5431.42	7.09	5430.45	9.16	5432.48		5441.64	6.98	5431.08
26-Sep-87	5.82	5429.32	5.65	5431.05	6.90	5431.23	6.81	5430.73	9.10	5432.54		5441.64	7.15	5430.91
27-Oct-87	6.67	5429.47	5.53	5431.17	6.89	5431.24	6.76	5430.78	9.00	5432.64		5441.64	7.11	5430.95
29-Nov-87	5.75	5429.39	5.75	5430.95	6.95	5431.18	7.10	5430.44	9.10	5432.54		5441.64	7.18	5430.88
31-Dec-87	5.81	5429.33	5.82	5430.88	7.02	5431.11	7.22	5430.32	9.15	5432.49		5441.64	7.25	5430.81
28-Jan-88	5.77	5429.37	5.46	5431.24	7.02	5431.11	6.66	5430.88	9.05	5432.59		5441.64	7.25	5430.81
26-Feb-88	5.69	5429.45	5.22	5431.48	6.92	5431.21	6.48	5431.06	8.89	5432.75		5441.64	7.14	5430.92
31-Mar-88	5.65	5429.49	5.35	5431.35	6.82	5431.31	6.35	5431.19	8.82	5432.82		5441.64	7.06	5431.00
30-Apr-88	5.40	5429.74	4.85	5431.85	6.55	5431.58	5.65	5431.89	8.56	5433.08		5441.64	6.81	5431.25
31-May-88	5.54	5429.60	5.26	5431.44	6.76	5431.37	5.83	5431.71	8.87	5432.77		5441.64	6.99	5431.07
28-Jun-88	5.43	5429.71	4.94	5431.76	6.50	5431.63	6.14	5431.40	8.65	5432.99		5441.64	6.76	5431.30
27-Jul-88	5.62	5429.52	5.48	5431.22	6.86	5431.27	6.45	5431.09	8.80	5432.84		5441.64	7.10	5430.96
26-Aug-88	5.68	5429.46	5.59	5431.11	6.90	5431.23	6.46	5431.08	8.83	5432.81		5441.64	7.13	5430.93
29-Sep-88	5.81	5429.33	5.53	5431.17	6.87	5431.26	6.36	5431.18	8.80	5432.84		5441.64	7.10	5430.96
27-Oct-88	5.72	5429.42	5.63	5431.07	6.81	5431.32	6.05	5431.49	8.73	5432.91		5441.64	7.05	5431.01
28-Nov-88	5.72	5429.42	5.64	5431.06	6.84	5431.29	6.09	5431.45	8.79	5432.85		5441.64	7.07	5430.99
28-Dec-88	5.89	5429.25	5.62	5431.08	6.94	5431.19	6.48	5431.06	8.83	5432.81		5441.64	7.17	5430.89
06-Feb-89	5.87	5429.27	5.68	5431.02	6.91	5431.22	6.31	5431.23	8.85	5432.79		5441.64	7.13	5430.93
05-Mar-89	5.91	5429.23	7.38	5429.32	6.93	5431.20	6.27	5431.27	8.78	5432.86		5441.64	7.16	5430.90
27-Mar-89	5.21	5429.93	4.60	5432.10	6.16	5431.97	5.12	5432.42	7.65	5433.99		5441.64	6.43	5431.63
27-Apr-89	5.36	5429.78	5.79	5430.91	6.42	5431.71	5.50	5432.04	8.25	5433.39		5441.64	6.68	5431.38
26-May-89	5.54	5429.60	5.24	5431.46	6.45	5431.68	5.63	5431.91	8.45	5433.19		5441.64	6.72	5431.34
28-Jun-89	5.51	5429.63	5.28	5431.42	6.45	5431.68	5.90	5431.64	8.50	5433.14		5441.64	6.68	5431.38
28-Jul-89														
28-Aug-89	5.48	5429.66	5.36	5431.34	6.35	5431.78	5.66	5431.88	8.10	5433.54		5441.64	6.61	5431.45
30-Sep-89	5.51	5429.63	5.33	5431.37	6.33	5431.81	5.60	5431.94	8.28	5433.36		5441.64	5.60	5432.46
30-Oct-89	5.51	5429.63	5.36	5431.34	6.37	5431.76	6.67	5430.87	8.50	5433.14		5441.64	6.62	5431.44
30-Nov-89	5.60	5429.54	5.48	5431.22	6.46	5431.67	5.75	5431.79	8.31	5433.33		5441.64	6.70	5431.36
31-Dec-89	5.70	5429.44	5.57	5431.13	6.55	5431.58	5.84	5431.70	8.35	5433.29		5441.64	6.81	5431.25
29-Jan-90	5.67	5429.47	5.54	5431.16	6.55	5431.58	6.03	5431.51	8.43	5433.21		5441.64	6.80	5431.26
07-Mar-90	5.56	5429.58			6.44	5431.69		5437.54	8.30	5433.34		5441.64	6.68	5431.38
07-Apr-90	5.67	5429.47	5.46	5431.24	6.32	5431.81	6.45	5431.09	8.01	5433.63		5441.64	6.62	5431.44
30-Apr-90	5.51	5429.63	5.40	5431.30	6.31	5431.82	6.13	5431.41				5441.64	6.59	5431.47

MONTANA POLE TREATMENT PLANT
MONTHLY PRODUCT LEVEL AND WATER LEVEL DATA
MONTANA BUREAU OF MINES AND GEOLOGY

DEPTH TO WATER

	WELL 1	5435.14	WELL 2	5436.70	WELL 3	5438.13	WELL 4	5437.54	WELL 5	5441.64	WELL 5A	5441.64	WELL 6	5438.06
01-Jun-90	5.32	5429.82	5.21	5431.49	6.10	5432.03	6.10	5431.44	8.11	5433.53		5441.64	8.39	5431.67
02-Jul-90	6.50	5429.64	5.37	5431.33	6.23	5431.90	5.57	5431.97	7.90	5433.74		5441.64	6.51	5431.55
31-Jul-90	5.48	5429.66	5.39	5431.31	6.26	5431.87	5.61	5431.93	7.78	5433.86		5441.64	6.54	5431.52
01-Sep-90	5.25	5429.89	5.12	5431.58	6.00	5432.13	5.32	5432.22	7.72	5433.92		5441.64	6.30	5431.76
06-Oct-90	5.40	5429.74	5.28	5431.42	6.15	5431.98	5.49	5432.05	7.59	5434.05		5441.64	6.43	5431.63
30-Oct-90	5.44	5429.70	5.32	5431.38	6.17	5431.96	5.53	5432.01	7.93	5433.71		5441.64	6.45	5431.61
30-Nov-90	5.55	5429.59	5.38	5431.32	6.27	5431.86	5.61	5431.93	7.95	5433.69		5441.64	6.54	5431.52
31-Dec-90	5.71	5429.43	5.50	5431.20	6.34	5431.79	5.71	5431.83	8.15	5433.49		5441.64	6.60	5431.46
01-Feb-91	5.75	5429.39	5.52	5431.18	6.37	5431.76	5.77	5431.77	8.25	5433.39		5441.64	6.64	5431.42
01-Mar-91	5.69	5429.45	7.51	5429.19	6.35	5431.78	5.69	5431.85	8.18	5433.46		5441.64	6.61	5431.45
29-Mar-91	5.68	5429.46	7.82	5428.88	6.25	5431.88	5.61	5431.93	8.05	5433.59		5441.64	6.55	5431.51
30-Apr-91	6.60	5429.54	7.25	5429.45	6.27	5431.86	5.58	5431.96	8.17	5433.47		5441.64	6.59	5431.47
03-Jun-91	5.46	5429.68	6.17	5430.53	6.10	5432.03	5.43	5432.11	8.33	5433.31		5441.64	6.37	5431.69
28-Jun-91	5.24	5429.90	5.02	5431.68	5.89	5432.24	5.16	5432.38	7.70	5433.94		5441.64	6.15	5431.91
31-Jul-91	5.52	5429.62	5.41	5431.29	6.18	5431.95	5.55	5431.99	7.86	5433.78		5441.64	6.46	5431.60
28-Aug-91	5.57	5429.57	5.43	5431.27	6.15	5431.98	5.54	5432.00	8.13	5433.51		5441.64	6.42	5431.64
30-Sep-91	5.51	5429.63	5.36	5431.34	6.06	5432.07	5.46	5432.08	8.09	5433.55		5441.64	6.33	5431.73
01-Nov-91	5.53	5429.61	5.36	5431.34	6.05	5432.08	5.45	5432.09	8.15	5433.49		5441.64	6.34	5431.72
02-Dec-91	5.55	5429.59	5.38	5431.32	6.09	5432.04	5.47	5432.07	8.33	5433.31		5441.64	6.38	5431.68
31-Dec-91	5.69	5429.45	5.51	5431.19	6.23	5431.90	5.64	5431.90	8.52	5433.12		5441.64	6.54	5431.52
28-Jan-92	5.64	5429.50	5.54	5431.16	6.20	5431.93	5.60	5431.94	8.49	5433.15		5441.64	6.50	5431.56
29-Feb-92														
31-Mar-92														
30-Apr-92	5.66	5429.48	7.60	5429.10	6.24	5431.89	5.59	5431.95	8.14	5433.50		5441.64	6.52	5431.54
27-May-92	5.66	5429.48	7.80	5428.90	6.21	5431.92	5.66	5431.88	8.45	5433.19	7.04	5434.60	6.51	5431.55
30-Jun-92	5.24	5429.90	7.03	5429.67	5.71	5432.42	5.25	5432.29	8.13	5433.51	6.51	5435.13	6.03	5432.03
03-Aug-92	5.48	5429.66	5.33	5431.37	6.05	5432.08	5.46	5432.08	8.07	5433.57	6.75	5434.89	6.35	5431.71
29-Aug-92	5.50	5429.64	5.35	5431.35	6.04	5432.09	5.47	5432.07	8.23	5433.41	6.83	5434.81	6.35	5431.71
30-Sep-92	5.45	5429.69	5.40	5431.30	5.97	5432.16	5.16	5432.38	8.31	5433.33	8.33	5433.31	6.30	5431.76
31-Oct-92	5.34	5429.80	5.15	5431.55	5.93	5432.20	5.30	5432.24	8.33	5433.31			6.20	5431.86
03-Dec-92	5.45	5429.69	5.26	5431.44	6.09	5432.04	5.41	5432.13	8.57	5433.07			6.36	5431.70
05-Jan-93	NR		NR		NR		NR		8.60	5433.04			6.39	5431.67

MONTANA POLE TREATMENT PLANT
MONTHLY PRODUCT LEVEL AND WATER LEVEL DATA
MONTANA BUREAU OF MINES AND GEOLOGY

DEPTH TO WATER

	WELL 8	5445.69	WELL 9	5450.42 5450.52	WELL 10	5440.59	WELL 11	5447.63	WELL 13	5451.80	WELL 14	5451.14	WELL 15	5451.50
22-Nov-86	13.02	5432.67	16.98	5433.54	8.26	5432.33	12.84	5434.79	16.20	5435.40	16.13	5435.01	18.25	5435.25
27-Dec-86	13.05	5432.64	7.17	5443.35	8.35	5432.24	13.00	5434.63	16.41	5435.19	16.31	5434.83	16.27	5435.23
10-Jan-87	12.90	5432.79	17.24	5433.28	8.32	5432.27	13.08	5434.55	16.49	5435.11	16.39	5434.75	16.07	5435.43
24-Jan-87	12.97	5432.72	17.31	5433.21	8.37	5432.22	13.12	5434.51	16.53	5435.07	16.44	5434.70	16.15	5435.35
21-Feb-87	12.89	5432.80	17.18	5433.34	8.86	5431.73	13.04	5434.59	16.53	5435.07	16.41	5434.73	16.11	5435.39
01-Apr-87	12.74	5432.95	17.15	5433.37	8.35	5432.24	12.97	5434.66	16.45	5435.15	16.35	5434.79	16.15	5435.35
25-Apr-87	12.74	5432.95	17.12	5433.40	8.25	5432.34	12.89	5434.74	16.41	5435.19	16.31	5434.83	16.16	5435.34
29-May-87	12.60	5433.09	16.55	5433.97	7.70	5432.89	12.10	5435.53	15.77	5435.83	15.70	5435.44	15.70	5435.80
29-Jun-87	12.80	5432.89	16.58	5433.94	10.10	5430.49	12.39	5435.24	15.70	5435.90	15.61	5435.53	15.72	5435.78
25-Jul-87	12.74	5432.95	16.19	5434.33	10.14	5430.45	11.87	5435.76	15.32	5436.28	15.22	5435.92	15.68	5435.82
01-Sep-87	12.91	5432.78	16.62	5433.90	10.09	5430.50	12.30	5435.33	15.70	5435.90	15.58	5435.56	15.80	5435.70
26-Sep-87	12.10	5433.59	16.93	5433.59	8.41	5432.18	12.62	5435.01	16.03	5435.57	15.92	5435.22	15.41	5436.09
27-Oct-87	12.28	5433.41	16.99	5433.53	8.98	5431.61	12.75	5434.88	16.21	5435.39	16.09	5435.05	15.55	5435.95
29-Nov-87	12.49	5433.20	17.20	5433.32	10.15	5430.44	12.90	5434.73	16.40	5435.20	16.27	5434.87	15.75	5435.75
31-Dec-87	12.50	5433.19	17.25	5433.27	10.32	5430.27	13.01	5434.62	16.49	5435.11	16.37	5434.77	15.95	5435.55
28-Jan-88	12.32	5433.37	17.22	5433.30	8.89	5431.70	13.01	5434.62	16.52	5435.08	16.41	5434.73	16.04	5435.46
26-Feb-88	12.11	5433.58	17.17	5433.35	8.17	5432.42	12.95	5434.68	16.47	5435.13	16.37	5434.77	16.05	5435.45
31-Mar-88	12.11	5433.58	17.14	5433.38	8.16	5432.43	12.90	5434.73	16.42	5435.18	16.32	5434.82	16.00	5435.50
30-Apr-88	11.85	5433.84	16.80	5433.72	7.75	5432.84	12.55	5435.08	16.05	5435.55	15.95	5435.19	15.58	5435.92
31-May-88	12.05	5433.64	16.90	5433.62	8.01	5432.58	12.67	5434.96	16.14	5435.46	16.02	5435.12	15.60	5435.90
28-Jun-88	12.25	5433.44	16.83	5433.69	7.95	5432.64	12.50	5435.13	16.01	5435.59	15.91	5435.23	15.40	5436.10
27-Jul-88	12.44	5433.25	17.02	5433.50	8.24	5432.35	12.76	5434.87	16.21	5435.39	16.11	5435.03	15.60	5435.90
26-Aug-88	12.83	5432.86	17.15	5433.37	8.37	5432.22	12.91	5434.72	16.39	5435.21	16.28	5434.86	15.75	5435.75
29-Sep-88	13.21	5432.48	17.19	5433.33	8.88	5431.71	12.84	5434.79	16.35	5435.25	16.23	5434.91	15.70	5435.80
27-Oct-88	13.28	5432.41	17.09	5433.43	8.37	5432.22	12.77	5434.86	16.21	5435.39	16.13	5435.01	15.30	5436.20
28-Nov-88	13.56	5432.13	17.14	5433.38	8.40	5432.19	12.84	5434.79	16.32	5435.28	16.22	5434.92	15.62	5435.88
28-Dec-88	13.51	5432.18	17.25	5433.27	8.51	5432.08	12.94	5434.69	16.39	5435.21	16.31	5434.83	15.58	5435.92
06-Feb-89	13.72	5431.97	17.31	5433.21	8.51	5432.08	13.00	5434.63	16.58	5435.02	16.44	5434.70	15.84	5435.66
05-Mar-89	13.95	5431.74	17.35	5433.17	8.56	5432.03	13.03	5434.60	16.54	5435.06	16.45	5434.69	15.83	5435.67
27-Mar-89	13.46	5432.23	16.46	5434.06	7.27	5433.32	12.06	5435.57	15.61	5435.99	15.56	5435.58	15.14	5436.36
27-Apr-89	13.55	5432.14	16.56	5433.96	8.26	5432.33	12.34	5435.29	15.80	5435.80	15.68	5435.46	15.17	5436.33
26-May-89	13.35	5432.34	16.71	5433.81	7.93	5432.66	12.40	5435.23	15.84	5435.76	15.73	5435.41	15.18	5436.32
28-Jun-89	14.25	5431.44	16.76	5433.76	8.01	5432.58	12.46	5435.17	15.98	5435.62	15.86	5435.28	15.33	5436.17
28-Jul-89														
28-Aug-89	14.13	5431.56	16.67	5433.85	7.89	5432.70	12.32	5435.31	15.74	5435.86	15.77	5435.37	16.25	5435.25
30-Sep-89	14.30	5431.39	15.58	5434.94	7.95	5432.64	12.22	5435.41	15.65	5435.95	15.53	5435.62	16.35	5435.15
30-Oct-89	14.42	5431.27	16.71	5433.81	8.03	5432.56	12.37	5435.26	15.80	5435.80	15.69	5435.45	16.32	5435.18
30-Nov-89	14.51	5431.18	13.85	5436.67	8.14	5432.45	12.55	5435.08	15.98	5435.62	15.88	5435.26	16.40	5435.10
31-Dec-89	14.66	5431.03	16.95	5433.57	8.22	5432.37	12.63	5435.00	16.00	5435.60	15.91	5435.23	16.38	5435.12
29-Jan-90	14.74	5430.95	16.96	5433.56	8.21	5432.38	12.65	5434.98	16.24	5435.36	15.96	5435.18	16.45	5435.05
07-Mar-90	14.70	5430.99	16.87	5433.65			12.57	5435.06	16.21	5435.39	15.89	5435.25	16.34	5435.16
07-Apr-90	14.48	5431.21	16.77	5433.75	8.00	5432.59	12.40	5435.23	15.94	5435.66	15.78	5435.36	16.30	5435.20
30-Apr-90	14.13	5431.56	16.76	5433.76	7.99	5432.60	12.41	5435.22	16.00	5435.60	15.79	5435.35	16.32	5435.18

MONTANA POLE TREATMENT PLANT
MONTHLY PRODUCT LEVEL AND WATER LEVEL DATA
MONTANA BUREAU OF MINES AND GEOLOGY

DEPTH TO WATER

	WELL 8	5445.69	WELL 9	5450.42	WELL 10	5440.59	WELL 11	5447.63	WELL 13	5451.60	WELL 14	5451.14	WELL 15	5451.50
01-Jun-90	12.58	5433.11	16.74	5433.78	7.89	5432.70	12.42	5435.21	16.14	5435.46	15.84	5435.30	16.35	5435.15
02-Jul-90	13.50	5432.19	16.81	5433.71	8.00	5432.59	12.44	5435.19	15.97	5435.63	15.89	5435.25	16.35	5435.15
31-Jul-90	13.43	5432.26	16.91	5433.61	8.01	5432.58	12.37	5435.26	15.86	5435.74	15.78	5435.36	16.25	5435.25
01-Sep-90	13.90	5431.79	16.44	5434.08	7.71	5432.88	12.04	5435.59	15.64	5435.96	15.43	5435.71	16.12	5435.38
06-Oct-90	13.52	5432.17	16.59	5433.93	7.90	5432.69	12.30	5435.33	15.93	5435.67	15.65	5435.49	16.34	5435.16
30-Oct-90	13.46	5432.23	16.72	5433.80	7.95	5432.64	12.40	5435.23	16.11	5435.49	15.77	5435.37	16.37	5435.13
30-Nov-90	13.98	5431.71		5450.52	8.05	5432.54	12.52	5435.11	16.33	5435.27	15.90	5435.24	16.48	5435.02
31-Dec-90	13.18	5432.51	16.94	5433.58	8.14	5432.45	12.64	5434.99	16.44	5435.16	15.99	5435.15	16.58	5434.92
01-Feb-91	13.53	5432.16	16.95	5433.57	8.15	5432.44	12.65	5434.98	16.38	5435.22	15.99	5435.15	16.58	5434.92
01-Mar-91	13.09	5432.60	16.91	5433.61	8.11	5432.48	12.64	5434.99	16.20	5435.40	15.95	5435.19	16.55	5434.95
29-Mar-91	13.34	5432.35	16.83	5433.69	8.05	5432.54	12.55	5435.08	16.07	5435.53	15.87	5435.27	16.46	5435.04
30-Apr-91	13.14	5432.55	16.80	5433.72	7.99	5432.60	12.52	5435.11	16.06	5435.54	15.81	5435.33	16.37	5435.13
03-Jun-91	12.39	5433.30		5450.52	7.85	5432.74	12.32	5435.31	15.80	5435.80	15.66	5435.48	16.26	5435.24
28-Jun-91	12.98	5432.71	16.36	5434.16	7.58	5433.01	11.98	5435.65	15.43	5436.17	15.36	5435.78	16.07	5435.43
31-Jul-91	13.13	5432.56	16.76	5433.76	7.99	5432.60	12.47	5435.16	16.10	5435.50	15.84	5435.30	16.41	5435.09
28-Aug-91	13.40	5432.29	16.96	5433.56	8.11	5432.48	12.64	5434.99	16.41	5435.19	16.06	5435.08	16.65	5434.85
30-Sep-91	13.47	5432.22	16.79	5433.73	7.98	5432.61	12.44	5435.19	16.04	5435.56	15.84	5435.30	16.56	5434.94
01-Nov-91	13.96	5431.73	16.77	5433.75	7.96	5432.63	12.40	5435.23	15.99	5435.61	15.80	5435.34	16.25	5435.25
02-Dec-91	13.65	5432.04	16.70	5433.82	7.96	5432.63	12.43	5435.20	16.06	5435.54	15.83	5435.31	16.45	5435.05
31-Dec-91	13.88	5431.81	16.92	5433.60	8.10	5432.49	12.58	5435.05	16.26	5435.34	15.90	5435.24	16.53	5434.97
28-Jan-92	14.16	5431.53	16.93	5433.59	8.09	5432.50	12.60	5435.03	16.32	5435.28	15.90	5435.24	16.59	5434.91
29-Feb-92														
31-Mar-92														
30-Apr-92	14.11	5431.58	16.90	5433.62	8.04	5432.55	12.60	5435.03	16.17	5435.43	15.93	5435.21	16.50	5435.00
27-May-92	14.47	5431.22	17.09	5433.43	8.19	5432.40	12.73	5434.90	16.60	5435.00	16.15	5434.99	16.78	5434.72
30-Jun-92	14.71	5430.98	16.60	5433.92	7.75	5432.84	12.13	5435.50	15.83	5435.77	15.61	5435.53	16.40	5435.10
03-Aug-92	13.92	5431.77	16.78	5433.74	7.94	5432.65	12.46	5435.17	16.09	5435.51	15.84	5435.30	16.52	5434.98
29-Aug-92	14.36	5431.33	16.81	5433.71	8.01	5432.58	12.56	5435.07	16.15	5435.45	15.92	5435.22	16.51	5434.99
30-Sep-92	14.73	5430.96	16.81	5433.71	8.34	5432.25	12.44	5435.19	16.00	5435.60	15.81	5435.33	16.48	5435.02
31-Oct-92	13.97	5431.72	16.67	5433.85	7.84	5432.75	12.26	5435.37	15.85	5435.75	15.66	5435.48	16.37	5435.13
03-Dec-92	14.40	5431.29	16.78	5433.74	7.95	5432.64	12.41	5435.22	16.05	5435.55	15.80	5435.34	16.55	5434.95
05-Jan-93	14.76	5430.93	16.88	5433.64	8.40	5432.19	12.53	5435.10	16.23	5435.37	15.90	5435.24	16.65	5434.85

MONTANA POLE TREATMENT PLANT
MONTHLY PRODUCT LEVEL AND WATER LEVEL DATA
MONTANA BUREAU OF MINES AND GEOLOGY

DEPTH TO WATER

	WELL 16	6457.73	WELL 17	5438.80	WELL M1	5438.84	WELL M2	5436.14	WELL M3	5437.35	WELL M4	5438.80	WELL M5	5438.58
22-Nov-86	20.25	6437.48	23.45	5415.35										
27-Dec-86	20.46	5437.27	23.45	5415.35										
10-Jan-87	20.54	5437.19	23.45	5415.35										
24-Jan-87	20.60	5437.13												
21-Feb-87	20.61	5437.12												
01-Apr-87	20.57	5437.16												
25-Apr-87	20.52	5437.21												
29-May-87	20.10	5437.63												
29-Jun-87	19.67	5438.06			7.11	5431.73	5.75	5430.39	8.45	5428.90	6.12	5432.68	5.81	5432.77
25-Jul-87	19.35	5438.38			6.75	5432.09	5.40	5430.74	8.16	5429.19	5.72	5433.08	5.42	5433.16
01-Sep-87	19.63	5438.10			7.06	5431.78	5.74	5430.40	8.65	5428.70	6.13	5432.67	5.87	5432.71
26-Sep-87	19.88	5437.85			7.20	5431.64	5.83	5430.31	8.63	5428.72	6.41	5432.39	6.15	5432.43
27-Oct-87	20.14	5437.59			7.14	5431.70	5.77	5430.37	8.51	5428.84	6.42	5432.38	6.14	5432.44
29-Nov-87	20.34	5437.39			7.25	5431.59	5.87	5430.27	8.60	5428.75	6.53	5432.27	6.29	5432.29
31-Dec-87	20.47	5437.26			7.29	5431.55	5.94	5430.20	8.65	5428.70	6.60	5432.20	6.34	5432.24
28-Jan-88	20.56	5437.17			7.30	5431.54	5.94	5430.20	8.65	5428.70	6.63	5432.17	6.37	5432.21
26-Feb-88	20.57	5437.16			7.19	5431.65	5.86	5430.28	8.59	5428.76	6.55	5432.25	6.27	5432.31
31-Mar-88	20.53	5437.20			7.13	5431.71	5.80	5430.34	8.54	5428.81	6.38	5432.42	6.11	5432.47
30-Apr-88	20.22	5437.51			6.89	5431.95	5.55	5430.59	8.35	5429.00	6.05	5432.75	5.80	5432.78
31-May-88	20.20	5437.53			7.08	5431.76	5.72	5430.42	8.47	5428.88	6.23	5432.57	5.95	5432.63
28-Jun-88	20.10	5437.63			6.82	5432.02	5.53	5430.61	8.36	5428.99	6.01	5432.79	5.74	5432.84
27-Jul-88	20.27	5437.46			7.16	5431.68	5.80	5430.34	8.49	5428.86	6.39	5432.41	6.11	5432.47
26-Aug-88	20.48	5437.25			7.19	5431.65	5.84	5430.30	8.51	5428.84	6.49	5432.31	6.25	5432.33
29-Sep-88	20.30	5437.43			7.13	5431.71	5.83	5430.31	8.60	5428.75	6.52	5432.28	6.27	5432.31
27-Oct-88	20.07	5437.68			7.08	5431.76	5.78	5430.36	8.53	5428.82	6.47	5432.33	6.22	5432.36
28-Nov-88	20.27	5437.46			7.11	5431.73	5.80	5430.34	8.54	5428.81	6.45	5432.35	6.28	5432.30
28-Dec-88	20.22	5437.51			7.21	5431.63	5.91	5430.23	8.68	5428.67	6.64	5432.16	6.39	5432.19
06-Feb-89	20.33	5437.40			7.14	5431.70	5.83	5430.31	8.61	5428.74	6.59	5432.21	6.37	5432.21
05-Mar-89	20.35	5437.38			7.19	5431.65	5.90	5430.24	8.68	5428.67	6.63	5432.17	6.39	5432.19
27-Mar-89	19.77	5437.96			6.52	5432.32	5.25	5430.89	8.17	5429.18	5.57	5433.23	5.30	5433.28
27-Apr-89	19.85	5437.88			6.76	5432.08	5.46	5430.68	8.30	5429.05	5.98	5432.82	5.71	5432.87
26-May-89	19.73	5438.00			6.76	5432.08	5.52	5430.62	8.43	5428.92	6.07	5432.73	5.83	5432.75
28-Jun-89	19.68	5438.05			6.71	5432.13	5.45	5430.69	8.36	5428.99	6.02	5432.78	5.85	5432.73
28-Jul-89														
28-Aug-89	19.63	5438.10			6.62	5432.22	5.36	5430.78	8.30	5429.05	6.01	5432.79	5.77	5432.81
30-Sep-89	19.47	5438.26			6.62	5432.22	6.12	5430.02	8.32	5429.03	5.99	5432.81	5.75	5432.83
30-Oct-89	19.63	5438.10			6.62	5432.22	6.14	5430.00	8.33	5429.02	6.07	5432.73	5.83	5432.75
30-Nov-89	19.87	5437.86			6.72	5432.12	5.47	5430.67	8.40	5428.95	6.20	5432.60	5.96	5432.62
31-Dec-89	19.83	5437.90			6.81	5432.03	6.33	5429.81	8.49	5428.86	6.29	5432.51	6.06	5432.52
29-Jan-90	19.93	5437.80			6.82	5432.02	6.32	5429.82	8.49	5428.86	6.28	5432.52	6.05	5432.53
07-Mar-90	19.90	5437.83			6.69	5432.15	6.18	5429.96	8.39	5428.96	6.15	5432.65	5.89	5432.69
07-Apr-90	19.73	5438.00			6.63	5432.21	6.17	5429.97	8.48	5428.87	6.03	5432.77	5.79	5432.79
30-Apr-90	19.71	5438.02			6.60	5432.24	6.11	5430.03	8.35	5429.00	6.01	5432.79	5.78	5432.80

MONTANA POLE TREATMENT PLANT
MONTHLY PRODUCT LEVEL AND WATER LEVEL DATA
MONTANA BUREAU OF MINES AND GEOLOGY

DEPTH TO WATER

	WELL 16	5457.73	WELL 17	5438.80	WELL M1	5438.84	WELL M2	5436.14	WELL M3	5437.35	WELL M4	5438.80	WELL M5	5438.58
01-Jun-90	19.96	5437.77			6.38	5432.46	5.89	5430.25	8.11	5429.24	5.82	5432.98	5.55	5433.03
02-Jul-90	19.95	5437.78			6.52	5432.32	6.03	5430.11	8.32	5429.03	5.93	5432.87	5.72	5432.86
31-Jul-90	19.69	5438.04			6.53	5432.31	5.29	5430.85	8.29	5429.06	6.00	5432.80	5.81	5432.77
01-Sep-90	19.46	5438.27			6.31	5432.53	5.09	5431.05	8.12	5429.23	5.70	5433.10	5.50	5433.08
06-Oct-90	19.70	5438.03			6.41	5432.43	5.18	5430.96	8.11	5429.24	5.92	5432.88	5.71	5432.87
30-Oct-90	19.82	5437.91			6.42	5432.42	5.94	5430.20	8.24	5429.11	5.98	5432.82	5.78	5432.80
30-Nov-90	19.96	5437.77			6.51	5432.33	6.05	5430.09	8.35	5429.00	6.08	5432.72	5.87	5432.71
31-Dec-90	20.05	5437.68			6.57	5432.27	6.11	5430.03	8.43	5428.92	6.18	5432.62	6.00	5432.58
01-Feb-91	20.09	5437.64			6.61	5432.23	6.14	5430.00	8.46	5428.89	6.22	5432.58	6.04	5432.54
01-Mar-91	20.08	5437.65			6.60	5432.24	6.14	5430.00	8.45	5428.90	6.16	5432.64	6.00	5432.58
29-Mar-91	19.98	5437.75			6.52	5432.32	6.06	5430.08	8.40	5428.95	6.08	5432.72	5.90	5432.68
30-Apr-91	19.86	5437.87			6.57	5432.27	6.06	5430.08	8.39	5428.96	6.05	5432.75	5.85	5432.73
03-Jun-91	19.69	5438.04			6.35	5432.49	5.06	5431.08	8.25	5429.10	5.88	5432.92	5.71	5432.87
28-Jun-91	19.51	5438.22			6.14	5432.70	4.86	5431.28	8.09	5429.26	5.56	5433.24	5.38	5433.20
31-Jul-91	20.08	5437.65			6.42	5432.42	5.13	5431.01	8.34	5429.01	6.00	5432.80	5.82	5432.76
28-Aug-91	20.38	5437.35			6.35	5432.49	5.10	5431.04	8.30	5429.05	5.99	5432.81	5.82	5432.76
30-Sep-91	19.90	5437.83	23.47	5415.33	6.28	5432.56	5.04	5431.10	8.22	5429.13	5.93	5432.87	5.75	5432.83
01-Nov-91	19.79	5437.94	23.47	5415.33	6.28	5432.56	5.04	5431.10	8.22	5429.13	5.92	5432.88	5.75	5432.83
02-Dec-91	19.84	5437.89	23.47	5415.33	6.32	5432.52	5.09	5431.05	8.26	5429.09	5.95	5432.85	5.78	5432.80
31-Dec-91	17.93	5439.80	23.47	5415.33	6.45	5432.39	5.24	5430.90	8.38	5428.97	6.12	5432.68	5.96	5432.62
28-Jan-92	20.00	5437.73	23.48	5415.32	6.47	5432.37	5.21	5430.93	8.35	5429.00	6.10	5432.70	5.93	5432.65
29-Feb-92														
31-Mar-92														
30-Apr-92	19.96	5437.77	23.47	5415.33	6.46	5432.38	5.23	5430.91	8.37	5428.98	6.07	5432.73	5.90	5432.68
27-May-92	20.41	5437.32	DRY		6.43	5432.41	5.20	5430.94	8.35	5429.00	6.10	5432.70	5.93	5432.65
30-Jun-92	19.85	5437.88	23.45	5415.35	6.00	5432.84	4.75	5431.39	8.00	5429.35	5.53	5433.27	5.35	5433.23
03-Aug-92	20.10	5437.63	DRY		6.27	5432.57	5.05	5431.09	8.17	5429.18	5.93	5432.87	5.75	5432.83
29-Aug-92	20.10	5437.63	DRY (23.46)		DESTROYED		5.05	5431.09	8.15	5429.20	5.95	5432.85	5.80	5432.78
30-Sep-92	19.83	5437.90	DRY (23.46)				5.05	5431.09	8.70	5428.65	5.97	5432.83	5.80	5432.78
31-Oct-92	19.67	5438.06	DRY (23.46)				DESTROYED		8.66	5428.69	5.77	5433.03	5.62	5432.96
03-Dec-92	19.80	5437.93	DRY (23.46)						8.65	5428.70	5.96	5432.84	5.80	5432.78
05-Jan-93	20.00	5437.73	DRY (23.46)						8.85	5428.50	NR		5.90	5432.68

MONTANA POLE TREATMENT PLANT
MONTHLY PRODUCT LEVEL AND WATER LEVEL DATA
MONTANA BUREAU OF MINES AND GEOLOGY

DEPTH TO WATER

	WELL M6	5438.79	WELL M7	5438.78	WELL M8	5438.88	WELL R1	WELL R2	WELL R3	WELL R4
22-Nov-86							5.29	7.29	11.30	14.01
27-Dec-86							5.44	7.01	11.39	13.22
10-Jan-87									11.60	14.38
24-Jan-87							5.48	7.08	11.51	
21-Feb-87							5.30	6.96	11.36	14.41
01-Apr-87							4.90	6.90	11.27	
25-Apr-87							5.05	6.78	11.21	14.21
29-May-87							4.22	6.20	10.50	13.30
29-Jun-87	7.94	5430.85	7.88	5430.92	8.01	5430.87	4.90	6.65	10.70	
25-Jul-87	7.62	5431.17	7.53	5431.25	7.65	5431.23	4.44	6.33	10.21	18.02
01-Sep-87	8.04	5430.75	7.99	5430.79	8.14	5430.74	5.05	6.65	10.69	13.94
26-Sep-87	8.16	5430.63	8.14	5430.64	8.27	5430.61	5.20	6.75	11.00	14.60
27-Oct-87	8.10	5430.69	8.05	5430.73	8.20	5430.68	5.10	6.70	11.10	14.65
29-Nov-87	8.20	5430.59	8.16	5430.62	8.35	5430.53	5.20	6.83	11.25	14.24
31-Dec-87	8.25	5430.54	8.22	5430.56	8.37	5430.51	5.25	6.88	11.32	14.45
28-Jan-88	8.25	5430.54	8.19	5430.59	8.33	5430.55	5.20			
26-Feb-88	8.15	5430.64	8.09	5430.69	8.23	5430.65	5.12	6.77	11.25	14.77
31-Mar-88	8.09	5430.70	8.01	5430.77	8.15	5430.73	5.22	6.70	11.20	16.55
30-Apr-88	7.83	5430.96	7.75	5431.03	7.86	5431.02	5.06	6.46	10.85	14.15
31-May-88	8.00	5430.79	7.92	5430.86	8.05	5430.83	5.31	6.65	10.97	14.10
28-Jun-88	7.80	5430.99	7.75	5431.03	7.90	5430.98	5.20	6.42	10.84	14.40
27-Jul-88	8.08	5430.71	8.04	5430.74	8.19	5430.69	5.48	6.73	11.08	14.47
26-Aug-88	8.14	5430.65	8.10	5430.68	8.25	5430.63	5.51	6.78	11.22	14.28
29-Sep-88	8.17	5430.62	8.11	5430.67	8.24	5430.64	5.57	6.78	11.20	14.62
27-Oct-88	8.11	5430.68	8.06	5430.72	8.21	5430.67	5.42	6.72	11.11	14.42
28-Nov-88	8.11	5430.68	8.09	5430.69	8.22	5430.66	5.42	6.73	11.15	14.18
28-Dec-88	8.26	5430.53	8.22	5430.56	8.35	5430.53	5.64	6.86	11.26	14.30
06-Feb-89	8.20	5430.59	8.17	5430.61	8.28	5430.60	6.88	6.79	11.33	14.36
05-Mar-89	8.26	5430.53	8.21	5430.57	8.35	5430.53	5.72	6.84	11.37	14.41
27-Mar-89	7.49	5431.30	7.39	5431.39	7.46	5431.42	4.95	6.13	10.35	13.17
27-Apr-89	7.73	5431.06	7.66	5431.12	7.78	5431.10	5.26	6.35	10.67	13.82
26-May-89	7.82	5430.97	7.78	5431.00	7.91	5430.97	5.35	6.43	10.75	13.78
28-Jun-89	7.74	5431.05	7.75	5431.03	7.92	5430.96	5.30	6.41	10.79	13.86
28-Jul-89										
28-Aug-89	7.71	5431.08	7.68	5431.10	7.84	5431.04	5.23	6.29	10.65	14.38
30-Sep-89	7.71	5431.08	7.72	5431.06	7.83	5431.05	5.31	6.31	10.58	13.63
30-Oct-89	7.74	5431.05	7.72	5431.06	7.86	5431.02	5.32	6.34	10.70	12.74
30-Nov-89	7.82	5430.97	7.80	5430.98	7.92	5430.96	5.37	6.41	10.86	13.91
31-Dec-89	7.94	5430.85	7.92	5430.86	8.05	5430.83	5.53	6.51	10.93	14.01
29-Jan-90	7.93	5430.86	7.91	5430.87	8.03	5430.85	5.49	6.50	10.96	14.05
07-Mar-90	7.81	5430.98	7.76	5431.02	7.89	5430.99	5.37	6.42	8.85	14.00
07-Apr-90	7.79	5431.00	7.76	5431.02	7.89	5430.99	5.42	6.35	10.71	13.76
30-Apr-90	7.73	5431.06	7.70	5431.08	7.83	5431.05	5.32	6.30	10.72	13.76

MONTANA POLE TREATMENT PLANT
MONTHLY PRODUCT LEVEL AND WATER LEVEL DATA
MONTANA BUREAU OF MINES AND GEOLOGY

DEPTH TO WATER

	WELL M6	5438.79	WELL M7	5438.78	WELL M8	5438.88	WELL R1	WELL R2	WELL R3	WELL R4
01-Jun-90	7.51	5431.28	7.48	5431.30	7.61	5431.27	4.84	6.12	10.67	13.70
02-Jul-90	7.64	5431.15	7.62	5431.16	7.75	5431.13	4.84	6.25	10.72	13.83
31-Jul-90	7.67	5431.12	7.65	5431.13	7.79	5431.09	4.91	6.28	10.69	13.77
01-Sep-90	7.42	5431.37	7.41	5431.37	7.53	5431.35	5.86	6.10	10.37	13.37
06-Oct-90	7.55	5431.24	7.51	5431.27	7.66	5431.22	5.05	6.19	10.60	13.69
30-Oct-90	7.52	5431.27	7.55	5431.23	7.69	5431.19	5.11	6.21	10.69	13.80
30-Nov-90	7.70	5431.09	7.66	5431.12	7.79	5431.09	5.24	6.28	10.70	14.25
31-Dec-90	7.75	5431.04	7.75	5431.03	7.87	5431.01	5.31	6.30	10.92	14.02
01-Feb-91	7.79	5431.00	7.77	5431.01	7.90	5430.98	5.33	6.32	10.96	14.00
01-Mar-91	7.79	5431.00	7.79	5430.99	7.89	5430.99	5.31	6.30	10.93	14.02
29-Mar-91	7.72	5431.07	7.69	5431.09	7.84	5431.04	5.29	6.29	10.85	13.93
30-Apr-91	7.70	5431.09	7.68	5431.10	7.79	5431.09	5.22	6.26	16.78	13.82
03-Jun-91	7.52	5431.27	7.50	5431.28	7.61	5431.27	5.05	6.07	10.59	13.59
28-Jun-91	7.30	5431.49	7.26	5431.52	7.39	5431.49	4.87	5.93	10.29	13.33
31-Jul-91	7.63	5431.16	7.61	5431.17	7.74	5431.14	5.27	6.18	10.75	13.84
28-Aug-91	7.59	5431.20	7.59	5431.19	7.71	5431.17	5.13	6.19	10.92	13.99
30-Sep-91	7.51	5431.28	7.49	5431.29	7.63	5431.25	5.06	6.12	10.74	13.80
01-Nov-91	7.52	5431.27	7.49	5431.29	7.63	5431.25	5.08	6.09	10.70	13.72
02-Dec-91	7.57	5431.22	7.54	5431.24	7.69	5431.19			10.64	14.17
31-Dec-91	7.71	5431.08	7.69	5431.09	7.83	5431.05	5.26	6.29	10.83	13.94
28-Jan-92	7.74	5431.05	7.66	5431.12	7.80	5431.08				
29-Feb-92										
31-Mar-92										
30-Apr-92	7.71	5431.08	7.70	5431.08	7.80	5431.08	5.27	6.23	10.84	13.90
27-May-92	7.70	5431.09	7.68	5431.10	7.80	5431.08	5.27	6.23	11.03	14.10
30-Jun-92	7.23	5431.56	7.21	5431.57	7.33	5431.55	4.80	5.85	10.45	13.51
03-Aug-92	7.57	5431.22	7.50	5431.28	7.63	5431.25	5.09	6.10	10.73	13.82
29-Aug-92	7.52	5431.27	7.50	5431.28	7.63	5431.25	5.10	6.06	10.81	14.05
30-Sep-92	7.54	5431.25	7.50	5431.28	7.62	5431.26	5.08	6.07	10.75	13.81
31-Oct-92	7.35	5431.44	7.30	5431.48	7.43	5431.45	4.93	5.86	10.56	13.62
03-Dec-92	7.45	5431.34	7.40	5431.38	7.53	5431.35	5.84	5.01	10.70	13.73
05-Jan-93	7.57	5431.22	NR		7.64	5431.24	4.73	5.95	10.83	13.86

MONTANA POLE TREATMENT PLANT
MONTHLY PRODUCT LEVEL AND WATER LEVEL DATA
MONTANA BUREAU OF MINES AND GEOLOGY

DEPTH TO PRODUCT

	WELL 1	5435.14	WELL 2	5436.70	WELL 3	5438.13	WELL 4	5437.54	WELL 5	5441.64	WELL 5A	5441.64	WELL 6	5438.06
22-Nov-86							6.09	5431.45	7.65	5433.99				
27-Dec-86							6.30	5431.24	7.85	5433.79				
10-Jan-87							6.38	5431.16	7.96	5433.68				
24-Jan-87							6.40	5431.14	7.99	5433.65				
21-Feb-87							6.26	5431.28	9.06	5432.58				
01-Apr-87							6.10	5431.44	7.79	5433.85				
25-Apr-87							5.96	5431.58	7.68	5433.96				
29-May-87							5.26	5432.28	6.87	5434.77				
29-Jun-87							5.78	5431.76	7.18	5434.46				
25-Jul-87							5.42	5432.12	6.72	5434.92				
01-Sep-87							5.97	5431.57	7.19	5434.45				
26-Sep-87							6.07	5431.47	7.52	5434.12				
27-Oct-87							6.04	5431.50	7.60	5434.04				
29-Nov-87							6.15	5431.39	7.75	5433.89				
31-Dec-87							6.15	5431.39	7.85	5433.79				
28-Jan-88							6.20	5431.34	7.83	5433.81				
26-Feb-88							6.09	5431.45	7.75	5433.89				
31-Mar-88							5.97	5431.57	7.70	5433.94				
30-Apr-88							5.64	5431.90	7.30	5434.34				
31-May-88							5.82	5431.72	7.46	5434.18				
28-Jun-88							5.64	5431.90	7.30	5434.34				
27-Jul-88							5.96	5431.58	7.60	5434.04				
26-Aug-88							6.04	5431.50	7.74	5433.90				
29-Sep-88							6.05	5431.49	7.70	5433.94				
27-Oct-88							6.03	5431.51	7.64	5434.00				
28-Nov-88							6.07	5431.47	7.71	5433.93				
28-Dec-88							6.18	5431.36	7.81	5433.83				
06-Feb-89							6.13	5431.41	7.85	5433.79				
05-Mar-89			5.75	5430.95			6.17	5431.37	7.88	5433.76				
27-Mar-89							5.11	5432.43	6.82	5434.82				
27-Apr-89			4.75	5431.95			5.49	5432.05	7.15	5434.49				
26-May-89			5.22	5431.48			5.61	5431.93	7.26	5434.38				
28-Jun-89			5.22	5431.48			5.70	5431.84	7.30	5434.34				
28-Jul-89														
28-Aug-89			5.33	5431.37			5.60	5431.94	7.23	5434.41				
30-Sep-89			5.30	5431.40			5.57	5431.97	7.13	5434.51				
30-Oct-89			5.34	5431.36			6.62	5430.92	7.26	5434.38				
30-Nov-89			5.45	5431.25			5.72	5431.82	7.43	5434.21				
31-Dec-89			5.55	5431.15			5.82	5431.72	7.53	5434.11				
29-Jan-90			5.52	5431.18			6.01	5431.53	7.53	5434.11				
07-Mar-90			5.48	5431.22			5.87	5431.67	7.41	5434.23				

MONTANA POLE TREATMENT PLANT
MONTHLY PRODUCT LEVEL AND WATER LEVEL DATA
MONTANA BUREAU OF MINES AND GEOLOGY

DEPTH TO PRODUCT

	WELL 1	5435.14	WELL 2	5436.70	WELL 3	5438.13	WELL 4	5437.54	WELL 5	5441.64	WELL 5A	5441.64	WELL 6	5438.06
07-Apr-90							5.69	5431.85	7.29	5434.35				
30-Apr-90							5.65	5431.89	7.29	5434.35				
01-Jun-90							5.43	5432.11	7.18	5434.46				
02-Jul-90							5.56	5431.98	7.27	5434.37				
31-Jul-90							5.60	5431.94	7.28	5434.36				
01-Sep-90							5.31	5432.23	6.94	5434.70				
06-Oct-90							5.48	5432.06	7.20	5434.44				
30-Oct-90							5.52	5432.02	7.27	5434.37				
30-Nov-90									7.39	5434.25				
31-Dec-90									7.51	5434.13				
01-Feb-91									7.53	5434.11				
01-Mar-91			5.39	5431.31					7.50	5434.14				
29-Mar-91			5.32	5431.38					7.42	5434.22				
30-Apr-91			5.30	5431.40					7.35	5434.29				
03-Jun-91			5.15	5431.55					7.16	5434.48				
28-Jun-91									6.73	5434.91				
31-Jul-91									7.33	5434.31				
28-Aug-91									7.45	5434.19				
30-Sep-91			5.24	5431.46					7.30	5434.34				
01-Nov-91			5.34	5431.36					7.23	5434.41				
02-Dec-91			5.36	5431.34					7.27	5434.37				
31-Dec-91			5.50	5431.20					7.45	5434.19				
28-Jan-92			5.49	5431.21					7.46	5434.18				
29-Feb-92				5436.70										
31-Mar-92				5436.70										
30-Apr-92			5.49	5431.21					7.46	5434.18				
27-May-92			5.42	5431.28					7.55	5434.09	7.02	5434.62		
30-Jun-92			5.03	5431.67					7.07	5434.57				
03-Aug-92			5.31	5431.39					7.30	5434.34				
29-Aug-92			5.33	5431.37					7.35	5434.29				
30-Sep-92			5.39	5431.31					7.32	5434.32				
31-Oct-92									7.11	5434.53				
03-Dec-92									7.26	5434.38				
05-Jan-93									7.43	5434.21				

MONTANA POLE TREATMENT PLANT
MONTHLY PRODUCT LEVEL AND WATER LEVEL DATA
MONTANA BUREAU OF MINES AND GEOLOGY

DEPTH TO PRODUCT

	WELL 8	5445.69	WELL 9	5450.42 5450.52	WELL 10	5440.59	WELL 11	5447.63	WELL 13	5451.60	WELL 14	5451.14	WELL 15	5451.50
22-Nov-86	11.75	5433.94			8.02	5432.57							15.22	5436.28
27-Dec-86	11.95	5433.74			8.25	5432.34							15.48	5436.02
10-Jan-87	12.08	5433.61			8.30	5432.29							15.57	5435.93
24-Jan-87	12.13	5433.56			8.35	5432.24							15.65	5435.85
21-Feb-87	11.99	5433.70			8.09	5432.50							15.64	5435.86
01-Apr-87	11.99	5433.70			8.18	5432.41							15.55	5435.95
25-Apr-87	11.87	5433.82			8.04	5432.55							15.51	5435.99
29-May-87	11.15	5434.54			7.41	5433.18							14.92	5436.58
29-Jun-87	11.26	5434.43			7.65	5432.94	11.99	5435.64			8.18	5442.96	14.71	5436.79
25-Jul-87	10.84	5434.85			7.33	5433.26							14.32	5437.18
01-Sep-87	11.32	5434.37			7.92	5432.67							14.69	5436.81
28-Sep-87	11.70	5433.99			8.27	5432.32							15.00	5436.50
27-Oct-87	11.82	5433.87			8.21	5432.38							15.20	5436.30
29-Nov-87	12.00	5433.69	7.75	5442.77	8.36	5432.23	12.00	5435.63			8.36	5442.78	15.43	5436.07
31-Dec-87	12.04	5433.65	7.75	5442.77	8.41	5432.18	12.00	5435.63			8.36	5442.78	15.55	5435.95
28-Jan-88	12.01	5433.68			8.24	5432.35							15.58	5435.94
26-Feb-88	11.99	5433.70			8.14	5432.45							15.58	5435.92
31-Mar-88	11.91	5433.78			8.15	5432.44							15.50	5436.00
30-Apr-88	11.55	5434.14			7.74	5432.85							15.16	5436.34
31-May-88	11.68	5434.01			8.00	5432.59							15.22	5436.28
28-Jun-88	11.56	5434.13			7.94	5432.65							15.05	5436.45
27-Jul-88	11.80	5433.89			8.23	5432.36							15.30	5436.20
26-Aug-88	11.93	5433.76			8.34	5432.25							15.50	5436.00
29-Sep-88	11.90	5433.79			8.32	5432.27							15.37	5436.13
27-Oct-88	11.79	5433.90			8.34	5432.25							15.12	5436.38
28-Nov-88	11.86	5433.83			8.39	5432.20							15.30	5436.20
28-Dec-88	11.95	5433.74			8.50	5432.09							15.34	5436.16
06-Feb-89	12.02	5433.67			8.49	5432.10							15.62	5435.88
05-Mar-89	12.05	5433.64			8.53	5432.06							15.52	5435.98
27-Mar-89	11.95	5433.74			7.26	5433.33							14.78	5436.72
27-Apr-89	11.22	5434.47			7.54	5433.05							14.85	5436.65
26-May-89	11.40	5434.29			7.92	5432.67							14.82	5436.68
28-Jun-89	12.12	5433.57			7.99	5432.60							15.00	5436.50
28-Jul-89														
28-Aug-89	11.32	5434.37			7.87	5432.72							15.80	5435.70
30-Sep-89	11.21	5434.48			7.92	5432.67			15.52	5436.08			15.68	5435.82
30-Oct-89	11.34	5434.35			8.00	5432.59							15.86	5435.64
30-Nov-89	11.51	5434.18			8.12	5432.47							16.13	5435.37
31-Dec-89	11.63	5434.06			8.20	5432.39			15.98	5435.62			16.09	5435.41
29-Jan-90	11.60	5434.09			8.19	5432.40			16.02	5435.58			16.15	5435.35
07-Mar-90	11.49	5434.20			8.17	5432.42			15.97	5435.63			16.14	5435.36

MONTANA POLE TREATMENT PLANT
MONTHLY PRODUCT LEVEL AND WATER LEVEL DATA
MONTANA BUREAU OF MINES AND GEOLOGY

DEPTH TO PRODUCT

	WELL 8	5445.69	WELL 9	5450.42	WELL 10	5440.59	WELL 11	5447.63	WELL 13	5451.60	WELL 14	5451.14	WELL 15	5451.50
07-Apr-90	11.42	5434.27							15.86	5435.74			15.96	5435.54
30-Apr-90	11.42	5434.27							15.82	5435.78			15.98	5435.54
01-Jun-90	11.47	5434.22							15.92	5435.68			16.13	5435.37
02-Jul-90	11.49	5434.20											16.13	5435.37
31-Jul-90	11.44	5434.25											15.94	5435.56
01-Sep-90	11.08	5434.63							15.57	5436.03			15.63	5435.87
06-Oct-90	11.34	5434.35							15.75	5435.85			15.91	5435.59
30-Oct-90	11.40	5434.29							15.85	5435.75			16.02	5435.48
30-Nov-90	11.56	5434.13							15.99	5435.61			16.16	5435.34
31-Dec-90	11.70	5433.99							16.07	5435.53			16.26	5435.24
01-Feb-91	11.72	5433.97							16.07	5435.53			16.29	5435.21
01-Mar-91	11.73	5433.96							16.03	5435.57			16.27	5435.23
29-Mar-91	11.58	5434.11							15.95	5435.65			16.18	5435.32
30-Apr-91	11.63	5434.06							15.89	5435.71			16.07	5435.43
03-Jun-91	11.37	5434.32							15.75	5435.85			15.90	5435.60
28-Jun-91	11.10	5434.59											15.61	5435.89
31-Jul-91	11.49	5434.20							15.95	5435.65			16.12	5435.38
28-Aug-91	11.70	5433.99							16.14	5435.46			16.38	5435.12
30-Sep-91	11.49	5434.20							15.93	5435.67			16.08	5435.42
01-Nov-91	11.42	5434.27							15.87	5435.73			15.99	5435.51
02-Dec-91	11.45	5434.24							15.92	5435.68			16.05	5435.45
31-Dec-91	11.60	5434.09							15.98	5435.62			16.16	5435.34
28-Jan-92	11.64	5434.05							15.96	5435.64			16.20	5435.30
29-Feb-92														
31-Mar-92														
30-Apr-92	11.64	5434.05							15.96	5435.64			16.20	5435.30
27-May-92	12.45	5433.24							16.29	5435.31			16.45	5435.05
30-Jun-92	11.98	5433.71							15.73	5435.87			15.97	5435.53
03-Aug-92	12.12	5433.57							15.93	5435.67			16.15	5435.35
29-Aug-92	12.23	5433.46							16.01	5435.59			16.21	5435.29
30-Sep-92	12.16	5433.53							15.89	5435.71			16.03	5435.47
31-Oct-92	12.01	5433.68							15.84	5435.76			15.86	5435.64
03-Dec-92	12.16	5433.53							15.88	5435.72			16.05	5435.45
05-Jan-93	12.31	5433.38							15.98	5435.62			16.22	5435.28

MONTANA POLE TREATMENT PLANT
MONTHLY PRODUCT LEVEL AND WATER LEVEL DATA
MONTANA BUREAU OF MINES AND GEOLOGY

	WELL 16		WELL 17		WELL M1		WELL M2		WELL M3		WELL M4		WELL M5	
		5457.73		5438.80		5438.84		5436.14		5437.35		5438.80		5438.58
22-Nov-86														
27-Dec-86														
10-Jan-87														
24-Jan-87														
21-Feb-87														
01-Apr-87														
25-Apr-87														
29-May-87														
29-Jun-87														
25-Jul-87														
01-Sep-87														
26-Sep-87														
27-Oct-87														
29-Nov-87														
31-Dec-87														
28-Jan-88														
26-Feb-88														
31-Mar-88														
30-Apr-88														
31-May-88														
28-Jun-88														
27-Jul-88														
26-Aug-88														
29-Sep-88														
27-Oct-88														
28-Nov-88														
28-Dec-88														
06-Feb-89														
05-Mar-89														
27-Mar-89														
27-Apr-89														
26-May-89														
28-Jun-89														
28-Jul-89														
28-Aug-89														
30-Sep-89														
30-Oct-89														
30-Nov-89														
31-Dec-89														
29-Jan-90														
07-Mar-90														

MONTANA POLE TREATMENT PLANT
MONTHLY PRODUCT LEVEL AND WATER LEVEL DATA
MONTANA BUREAU OF MINES AND GEOLOGY

	WELL 16	5457.73	WELL 17	5438.80	WELL M1	5438.84	WELL M2	5436.14	WELL M3	5437.35	WELL M4	5438.80	WELL M5	5438.58
07-Apr-90														
30-Apr-90														
01-Jun-90														
02-Jul-90														
31-Jul-90														
01-Sep-90														
06-Oct-90														
30-Oct-90														
30-Nov-90														
31-Dec-90														
01-Feb-91														
01-Mar-91														
29-Mar-91														
30-Apr-91														
03-Jun-91														
28-Jun-91														
31-Jul-91														
28-Aug-91														
30-Sep-91														
01-Nov-91														
02-Dec-91														
31-Dec-91														
28-Jan-92														
29-Feb-92														
31-Mar-92														
30-Apr-92														
27-May-92														
30-Jun-92														
03-Aug-92														
29-Aug-92														
30-Sep-92														
31-Oct-92														
03-Dec-92														
05-Jan-93														

MONTANA POLE TREATMENT PLANT
MONTHLY PRODUCT LEVEL AND WATER LEVEL DATA
MONTANA BUREAU OF MINES AND GEOLOGY

	DEPTH TO PRODUCT													
	WELL		WELL		WELL		WELL		WELL		WELL		WELL	
	M6	5438.79	M7	5438.78	M8	5438.88	R1		R2		R3		R4	
22-Nov-86														
27-Dec-86														
10-Jan-87														
24-Jan-87														
21-Feb-87														
01-Apr-87														
25-Apr-87													14.10	
29-May-87														
29-Jun-87														
25-Jul-87													12.93	
01-Sep-87													13.52	
26-Sep-87													13.85	
27-Oct-87													13.93	
29-Nov-87													14.14	
31-Dec-87													14.28	
28-Jan-88														
26-Feb-88													14.15	
31-Mar-88													14.08	
30-Apr-88													13.65	
31-May-88													13.85	
28-Jun-88													13.67	
27-Jul-88													13.95	
26-Aug-88													14.19	
29-Sep-88													14.17	
27-Oct-88													14.01	
28-Nov-88													14.14	
28-Dec-88													14.27	
06-Feb-89													14.34	
05-Mar-89													14.34	
27-Mar-89													13.16	
27-Apr-89													13.47	
26-May-89													13.62	
28-Jun-89													13.63	
28-Jul-89														
28-Aug-89													13.64	
30-Sep-89													13.51	
30-Oct-89													12.66	
30-Nov-89													13.84	
31-Dec-89														
29-Jan-90													13.92	
07-Mar-90													13.84	

MONTANA POLE TREATMENT PLANT
MONTHLY PRODUCT LEVEL AND WATER LEVEL DATA
MONTANA BUREAU OF MINES AND GEOLOGY

DEPTH TO PRODUCT

	WELL M6 5438.79	WELL M7 5438.78	WELL M8 5438.88	WELL R1	WELL R2	WELL R3	WELL R4
07-Apr-90							13.70
30-Apr-90							13.71
01-Jun-90							13.68
02-Jul-90							13.77
31-Jul-90							13.72
01-Sep-90							13.35
06-Oct-90							13.61
30-Oct-90							13.68
30-Nov-90							13.78
31-Dec-90							13.90
01-Feb-91							13.94
01-Mar-91							13.92
29-Mar-91							13.88
30-Apr-91							13.75
03-Jun-91							13.58
28-Jun-91							13.30
31-Jul-91							13.74
28-Aug-91							13.93
30-Sep-91							13.75
01-Nov-91							13.68
02-Dec-91							13.75
31-Dec-91							13.82
28-Jan-92							
29-Feb-92							
31-Mar-92							
30-Apr-92							13.90
27-May-92							14.04
30-Jun-92							13.48
03-Aug-92							13.78
29-Aug-92							13.80
30-Sep-92							13.75
31-Oct-92							13.57
03-Dec-92							13.70
05-Jan-93							13.83

MONTANA POLE TREATMENT PLANT
MONTHLY PRODUCT LEVEL AND WATER LEVEL DATA
MONTANA BUREAU OF MINES AND GEOLOGY

DEPTH TO WATER

	WELL GW1	5444.77	WELL GW2	5446.93	WELL GW3	5446.19	WELL GW4	5450.95	WELL GW5	5454.63	WELL GW6	5427.96	WELL GW7
01-Mar-91	5.69	5439.08	7.51	5439.42	6.35	5439.84	5.69	5445.26	8.18	5446.45	6.61	5421.35	13.09
29-Mar-91	8.90	5435.87	11.26	5435.67	10.40	5435.79	14.71	5436.24	19.05	5435.58	frozen	5427.96	19.63
30-Apr-91	8.80	5435.97	11.18	5435.75	10.32	5435.87	14.64	5436.31	18.95	5435.68	2.97	5424.99	19.55
03-Jun-91	8.64	5436.13	11.01	5435.92	10.17	5436.02	14.46	5436.49	18.69	5435.94	3.00	5424.96	19.63
28-Jun-91	8.29	5436.48	10.69	5436.24	9.86	5436.33	14.15	5436.80	18.50	5436.13	2.78	5425.18	19.25
31-Jul-91	8.79	5435.98	11.17	5435.76	10.34	5435.85	14.66	5436.29	18.96	5435.67	3.19	5424.77	20.24
28-Aug-91	9.03	5435.74	11.40	5435.53	10.37	5435.82	14.69	5436.26	19.22	5435.41	3.07	5424.89	20.40
30-Sep-91	7.73	5437.04	10.82	5436.11	10.28	5435.91	14.64	5436.31	19.01	5435.62	3.08	5424.88	19.43
01-Nov-91	8.65	5436.12	11.04	5435.89	10.21	5435.98	14.52	5436.43	18.66	5435.97	2.95	5425.01	19.38
02-Dec-91							14.48	5436.47	18.93	5435.70			19.44
31-Dec-91													
28-Jan-92													
29-Feb-92	8.25	5436.52	10.55	5436.38	9.84	5436.35	14.09	5436.86	18.48	5436.15	2.90	5425.06	19.25
31-Mar-92	8.40	5436.37	11.02	5435.91	10.19	5436.00	14.50	5436.45	18.81	5435.82	2.99	5424.97	19.46
30-Apr-92	8.82	5435.95	11.19	5435.74	10.35	5435.84	14.66	5436.29	19.00	5435.63	3.22	5424.74	19.59
27-May-92	9.12	5435.65	11.49	5435.44	10.65	5435.54	14.96	5435.99	19.30	5435.33	3.08	5424.88	20.26
30-Jun-92	8.60	5436.17	10.97	5435.96	10.09	5436.10	14.37	5436.58	18.78	5435.85	2.70	5425.26	19.45
03-Aug-92	8.81	5435.96	11.19	5435.74	10.35	5435.84	14.67	5436.28	18.78	5435.85	2.90	5425.06	20.14
29-Aug-92	8.90	5435.87	11.25	5435.68	10.46	5435.73	14.72	5436.23	19.08	5435.55	3.00	5424.96	19.68
30-Sep-92													
31-Oct-92	8.59	5436.18	10.95	5435.98	9.92	5436.27	14.43	5436.52	18.79	5435.84	2.94	5425.02	19.38
03-Dec-92	8.78	5435.99	11.10	5435.83	10.26	5435.93	14.57	5436.38	18.92	5435.71	3.11	5424.85	19.50

MONTANA POLE TREATMENT PLANT
MONTHLY PRODUCT LEVEL AND WATER LEVEL DATA
MONTANA BUREAU OF MINES AND GEOLOGY

DEPTH TO WATER

		WELL		WELL		WELL		WELL		WELL		WELL	
	5458.80	GW8	5460.83	GW9	5449.99	GW10	5446.81	GW11	5442.46	GW12	4338.01	GW13	5440.64
01-Mar-91	5445.71	16.91	5443.92	8.11	5441.88	12.64	5434.17	16.20	5426.26	15.95	4322.06	16.55	5424.09
29-Mar-91	5439.17	23.90	5436.93	17.73	5432.26	11.79	5435.02	9.15	5433.31	8.82	4329.19	7.80	5432.84
30-Apr-91	5439.25	23.78	5437.05	17.65	5432.34	11.79	5435.02	9.09	5433.37	8.77	4329.24	7.79	5432.85
03-Jun-91	5439.17	23.66	5437.17	17.53	5432.46	11.56	5435.25	8.92	5433.54	8.64	4329.37	7.62	5433.02
28-Jun-91	5439.55	23.38	5437.45	17.25	5432.74	11.21	5435.60	8.61	5433.85	8.40	4329.61	7.28	5433.36
31-Jul-91	5438.56	23.85	5436.98	17.60	5432.39	11.70	5435.11	9.04	5433.42	8.74	4329.27	7.74	5432.90
28-Aug-91	5438.40	24.15	5436.68	17.85	5432.14	11.83	5434.98	9.12	5433.34	8.73	4329.28	7.58	5433.06
30-Sep-91	5439.37	23.83	5437.00	17.66	5432.33	11.66	5435.15	9.00	5433.46	8.65	4329.36	7.58	5433.06
01-Nov-91	5439.42	23.65	5437.18	17.61	5432.38	11.63	5435.18	8.95	5433.51	8.68	4329.33	7.55	5433.09
02-Dec-91	5439.36	23.74	5437.09	17.62	5432.37	11.66	5435.15					7.60	5433.04
31-Dec-91													
28-Jan-92													
29-Feb-92	5439.55	23.33	5437.50	17.13	5432.86	11.11	5435.70	8.44	5434.02	8.34	4329.67	6.91	5433.73
31-Mar-92	5439.34	23.62	5437.21	17.60	5432.39	11.60	5435.21	8.99	5433.47	8.72	4329.29	7.62	5433.02
30-Apr-92	5439.21	23.81	5437.02	17.76	5432.23	11.79	5435.02	9.15	5433.31	8.86	4329.15	7.77	5432.87
27-May-92	5438.54	24.22	5436.61	17.93	5432.06	11.92	5434.89	9.21	5433.25	8.86	4329.15	7.73	5432.91
30-Jun-92	5439.35	23.70	5437.13	17.48	5432.51	11.75	5435.06	8.78	5433.68	8.44	4329.57	7.20	5433.44
03-Aug-92	5438.66	23.91	5436.92	17.65	5432.34	11.70	5435.11	9.02	5433.44	8.68	4329.33	7.57	5433.07
29-Aug-92	5439.12	23.96	5436.87	17.74	5432.25	11.76	5435.05	9.07	5433.39	8.70	4329.31	7.60	5433.04
30-Sep-92													
31-Oct-92	5439.42	23.57	5437.26	17.56	5432.43	11.48	5435.33	8.84	5433.62	8.57	4329.44	7.39	5433.25
03-Dec-92	5439.30	23.72	5437.11	17.68	5432.31	11.67	5435.14	9.04	5433.42	8.72	4329.29	7.61	5433.03

MONTANA POLE TREATMENT PLANT
MONTHLY PRODUCT LEVEL AND WATER LEVEL DATA
MONTANA BUREAU OF MINES AND GEOLOGY

DEPTH TO WATER

	WELL GW14	5435.55	WELL GW15	5438.33	WELL GW16	5436.96	WELL GW17	5440.33	WELL GW18	5437.82	WELL GW19	5439.57	WELL GW20A
01-Mar-91	20.08	5415.47	6.60	5431.73	6.14	5430.82	8.45	5431.88					
29-Mar-91	8.14	5427.41	8.20	5430.13	5.42	5431.54	7.30	5433.03					
30-Apr-91	8.07	5427.48	8.15	5430.18	5.35	5431.61	7.29	5433.04					
03-Jun-91	7.97	5427.58	7.97	5430.36	5.17	5431.79	7.12	5433.21					
28-Jun-91	7.72	5427.83	7.77	5430.56	4.94	5432.02	6.79	5433.54					
31-Jul-91	8.07	5427.48	8.05	5430.28	5.25	5431.71	7.20	5433.13					
28-Aug-91	7.95	5427.60	7.94	5430.39	5.18	5431.78	7.04	5433.29	7.19	5430.63	7.51	5432.06	9.67
30-Sep-91	7.97	5427.58	7.94	5430.39	5.09	5431.87	6.96	5433.37	7.06	5430.76	7.41	5432.16	10.45
01-Nov-91	7.97	5427.58	7.92	5430.41	5.06	5431.90	6.93	5433.40	7.20	5430.62	7.35	5432.22	10.55
02-Dec-91							7.04	5433.29			7.44	5432.13	
31-Dec-91													
28-Jan-92													
29-Feb-92	7.68	5427.87	7.35	5430.98	4.75	5432.21	6.80	5433.53	6.63	5431.19	6.98	5432.59	12.03
31-Mar-92	8.00	5427.55	8.03	5430.30	5.20	5431.76	7.11	5433.22	7.11	5430.71	7.41	5432.16	12.00
30-Apr-92	8.15	5427.40	8.14	5430.19	5.30	5431.66	7.25	5433.08	7.22	5430.60	7.55	5432.02	20.23
27-May-92	8.10	5427.45	8.10	5430.23	5.26	5431.70	7.19	5433.14	7.24	5430.58	7.56	5432.01	11.57
30-Jun-92	7.68	5427.87	7.66	5430.67	4.80	5432.16	6.67	5433.66	6.89	5430.93	6.75	5432.82	11.95
03-Aug-92	7.70	5427.85	7.92	5430.41	5.10	5431.86	7.00	5433.33	7.07	5430.75	7.40	5432.17	11.95
29-Aug-92	7.95	5427.60	8.00	5430.33	5.10	5431.86	7.03	5433.30	7.09	5430.73	7.41	5432.16	11.96
30-Sep-92													
31-Oct-92	7.85	5427.70	DESTROYED		5.00	5431.96	6.80	5433.53	6.83	5430.99	7.23	5432.34	10.32
03-Dec-92	7.93	5427.62	DESTROYED		5.18	5431.78	7.00	5433.33	6.84	5430.98	7.40	5432.17	12.03

MONTANA POLE TREATMENT PLANT
MONTHLY PRODUCT LEVEL AND WATER LEVEL DATA
MONTANA BUREAU OF MINES AND GEOLOGY

DEPTH TO WATER

	5457.47	WELL GW20B	5457.50	WELL GW20C	5458.20	WELL GW21	5451.85	WELL GW22	5457.12	WELL GW23A	5455.62	WELL GW23B	5455.42
01-Mar-91													
29-Mar-91													
30-Apr-91													
03-Jun-91													
28-Jun-91													
31-Jul-91													
28-Aug-91	5447.80	19.38	5438.12	20.71	5437.49	16.43	5435.42	20.72	5436.40	18.68	5436.94	18.72	5436.70
30-Sep-91	5447.02	19.36	5438.14	20.86	5437.34	16.24	5435.61	20.50	5436.62	18.02	5437.60	18.52	5436.90
01-Nov-91	5446.92	19.34	5438.16	20.62	5437.58	16.17	5435.68	20.33	5436.79	16.91	5438.71	18.32	5437.10
02-Dec-91										15.74	5439.88	18.44	5436.98
31-Dec-91													
28-Jan-92													
29-Feb-92	5445.44	18.95	5438.55	20.48	5437.72	15.12	5436.73	19.55	5437.57	14.73	5440.89	17.53	5437.89
31-Mar-92	5445.47	18.87	5438.63	20.53	5437.67	16.12	5435.73	20.30	5436.82	15.30	5440.32	18.26	5437.16
30-Apr-92	5437.24	19.36	5438.14	20.36	5437.84	16.29	5435.56	20.44	5436.68	16.24	5439.38	18.48	5436.94
27-May-92	5445.90	19.36	5438.14	21.09	5437.11	16.60	5435.25	20.91	5436.21	17.17	5438.45	18.91	5436.51
30-Jun-92	5445.52	19.18	5438.32	20.80	5437.40	16.06	5435.79	20.42	5436.70	17.17	5438.45	18.37	5437.05
03-Aug-92	5445.52	19.72	5437.78	20.90	5437.30	16.28	5435.57	20.60	5436.52	16.80	5438.82	18.63	5436.79
29-Aug-92	5445.51	19.36	5438.14	21.02	5437.18	16.35	5435.50	20.65	5436.47	17.27	5438.35	18.66	5436.76
30-Sep-92													
31-Oct-92	5447.15	19.17	5438.33	20.12	5438.08	16.07	5435.78	20.24	5436.88	16.05	5439.57	18.18	5437.24
03-Dec-92	5445.44	19.30	5438.20	20.65	5437.55	16.23	5435.62	20.40	5436.72	15.11	5440.51	18.35	5437.07

MONTANA POLE TREATMENT PLANT
MONTHLY PRODUCT LEVEL AND WATER LEVEL DATA
MONTANA BUREAU OF MINES AND GEOLOGY

DEPTH TO WATER

	WELL GW24	5455.31	WELL GW25	5458.72	WELL GW26	5460.60	WELL GW27	5453.28	WELL PZ-1
01-Mar-91									
29-Mar-91									
30-Apr-91									
03-Jun-91									
28-Jun-91									
31-Jul-91									
28-Aug-91	18.77	5436.54	21.82	5436.90	26.70	5433.90	20.50	5432.78	7.29
30-Sep-91	18.58	5436.73	21.59	5437.13	26.56	5434.04	20.39	5432.89	7.23
01-Nov-91	18.35	5436.96	21.32	5437.40	26.48	5434.12	20.31	5432.97	7.15
02-Dec-91	18.46	5436.85	21.32	5437.40	26.52	5434.08	20.36	5432.92	
31-Dec-91									
28-Jan-92									
29-Feb-92	17.42	5437.89	20.22	5438.50	26.07	5434.53	19.60	5433.68	6.42
31-Mar-92	18.30	5437.01	21.08	5437.64	26.49	5434.11	20.31	5432.97	7.20
30-Apr-92	18.52	5436.79	21.50	5437.22	26.63	5433.97	20.46	5432.82	7.30
27-May-92	18.95	5436.36	22.00	5436.72	26.88	5433.72	20.67	5432.61	7.26
30-Jun-92	18.40	5436.91	21.48	5437.24	26.40	5434.20	20.20	5433.08	6.83
03-Aug-92	18.65	5436.66	21.77	5436.95	26.56	5434.04	20.36	5432.92	7.18
29-Aug-92	18.68	5436.63	21.80	5436.92	26.66	5433.94	20.46	5432.82	7.15
30-Sep-92									
31-Oct-92	18.20	5437.11	21.07	5437.65	26.45	5434.15	20.27	5433.01	DESTROYED
03-Dec-92	18.36	5436.95	21.40	5437.32	25.54	5435.06	20.36	5432.92	

APPENDIX II

GROUND WATER QUALITY DATA
COLLECTED BY
KEYSTONE ENVIRONMENTAL RESOURCES, INC.

Pentachlorophenol in Ground Water
Hydrocarbon Scan
Aromatic Volatile Constituents
Polynuclear Aromatic Hydrocarbons (PAHs)
CLP Organics

PENTACHLOROPHENOL
IN GROUND WATER

LOCATION/WELL	DATE SAMPLED	WORK ORDER	UNITS	COMMENTS	Pentachlorophenol
BMW-1B	10/02/90	M90-10.23	ug/L		1
BMW-1Z	10/02/90	M90-10.23	ug/L	Field Duplicate of BMW-1B	1
GW-BMW-9A-2	11/13/90	M90-11.89	ug/L		1
BMW-10A	10/02/90	M90-10.23	ug/L		3.82
GS-12	10/03/90	M90-10.23	ug/L		1.02
GW-GS17-2	11/13/90	M90-11.89	ug/L		1
GS-18A	10/02/90	M90-10.23	ug/L		14.2
GW-GS22-2	11/13/90	M90-11.89	ug/L		4.37
GW-GS25-2	11/13/90	M90-11.89	ug/L		21.1
GW-GS34-2	11/13/90	M90-11.89	ug/L		1
GW-2-2	10/04/90	M90-10.23	ug/L		365
GW-3-2	10/04/90	M90-10.23	ug/L		19.8
GW-W13-2	10/29/90	M90-10.159	ug/l		1.61
GW-1D	10/29/90	M90-10.159	ug/l	Field Duplicate of GW-W13	1.48
GW-14	10/02/90	M90-10.23	ug/L		26.9
GW-W16-2	10/29/90	M90-10.159	ug/l		1850
GS-20A	10/02/90	M90-10.23	ug/L	Rinsate Blank	1
GW-1F	10/29/90	M90-10.159	ug/l	Rinsate Blank	1

LOCATION	DATE SAMPLED	DILUTION	WORK ORDER	A/B LEVEL	UNITS	COMMENTS	Benzene	Toluene	
GW-W01-1	06/26/90	1.0	H90-06.170	A	ug/L		2	3	
GW-W1-2	11/07/90	1.0	H90-11.46	A	ug/L		2	3	
GW-W02-1	06/22/90	1.0	H90-06.155	A	ug/L		1.1	5.5	
GW-W2-2	11/09/90	1.0	H90-11.46	A	ug/L		2	3	
GW-W03-1	06/22/90	1.0	H90-06.155	A	ug/L		2	3	
GW-W90-1	06/22/90	1.0	H90-06.155	A	ug/L	Field Dup of GW-W03-1	2	3	
GW-W3-2	11/07/90	1.0	H90-11.46	A	ug/L		2	3	
GW-W04-1	06/25/90	1.0	H90-06.170	A	ug/L		20	30	
GW-W4-2	11/11/90	1.0	H90-11.62	A	ug/L		2	3	
GW-W9Q-2	11/11/90	10.0	H90-11.62	A	ug/L	Field Duplicate of GW-W4-2	3.7	30	
GW-W05-1	06/22/90	5.0	H90-06.155	A	ug/L		17	17	
GW-W05-1	06/25/90	10.0	H90-06.170	A	ug/L	Product	54	32	
GW-W5-2	11/11/90	20.0	H90-11.62	A	ug/L		40	60	
GW-W06-1	06/22/90	1.0	H90-06.155	A	ug/L		2	3	
GW-W6-2	11/07/90	50.0	H90-11.46	A	ug/L		100	150	
GW-W08-1	06/25/90	10.0	H90-06.170	A	ug/L		20	57	
GW-W8-2	11/11/90	100.0	H90-11.62	A	ug/L		200	300	
GW-W08-1	06/25/90	5000.0	H90-06.170	A	ug/L	Product	10000	41000	
GW-W8-2	11/13/90	5000.0	H90-11.62	A	ug/L	Product	7000	34000	
GW-W09-1	06/25/90	1.0	H90-06.170	A	ug/L		2	3	
GW-W9-2	11/13/90	1.0	H90-11.62	A	ug/L		4.2	3	
GW-W10-1	06/26/90	1.0	H90-06.170	A	ug/L		9.2	3	
GW-W10-2	11/09/90	10.0	H90-11.46	A	ug/L		20	30	
GW-W9P-2	11/09/90	10.0	H90-11.46	A	ug/L	Field Duplicate of GW-W10-2	36	30	
GW-W11-1	06/25/90	1.0	H90-06.170	A	ug/L		2	3	
GW-W11-2	11/13/90	1.0	H90-11.62	A	ug/L		2	3	
GW-W13-1	06/25/90	10.0	H90-06.170	A	ug/L	Product	20	30	
GW-W13-1	06/25/90	10.0	H90-06.170	A	ug/L		55	30	
GW-W13-2	11/11/90	20.0	H90-11.62	A	ug/L		40	60	
GW-W014-1	06/21/90	1.0	H90-06.155	A	ug/L		2	3	
GW-W14-2	11/12/90	1.0	H90-11.62	A	ug/L		2	3	
GW-W15-1	06/25/90	1.0	H90-06.170	A	ug/L		2	9.6	
GW-W93-1	06/25/90	1.0	H90-06.170	A	ug/L	Field Duplicate of GW-W15-1	15	17	
GW-W15-1	06/25/90	1.0	H90-06.170	A	ug/L	Product	6.4	11	
GW-W15-2	11/11/90	20.0	H90-11.62	A	ug/L		40	60	
GW-W016-1	06/21/90	1.0	H90-06.155	A	ug/L		2	3	
GW-W16-2	11/12/90	1.0	H90-11.62	A	ug/L		2	3	
GW-M01-1	06/21/90	1.0	H90-06.155	A	ug/L		2	3	
GW-M1-2	11/07/90	1.0	H90-11.46	A	ug/L		2	3	
GW-M02-1	06/21/90	1.0	H90-06.155	A	ug/L		2	3	
GW-M2-2	11/06/90	1.0	H90-11.46	A	ug/L		2	3	
GW-W9M-2	11/06/90	1.0	H90-11.46	A	ug/L	Field Duplicate of GW-M2-2	2	3	
GW-M03-1	06/21/90	1.0	H90-06.155	A	ug/L		2	3	
GW-M3-2	11/06/90	10.0	H90-11.46	A	ug/L		20	30	
GW-M04-1	06/20/90	1.0	H90-06.155	A	ug/L		2	3	
GW-M4-2	11/06/90	1.0	H90-11.46	A	ug/L		2	3	

LOCATION	DATE SAMPLED	DILUTION	WORK ORDER	A/B LEVEL	UNITS	COMMENTS	Benzene	Toluene
GW-M05-1	06/20/90	1.0	H90-06.155	A	ug/L		2	3
GW-M5-2	11/06/90	50.0	H90-11.46	A	ug/L		120	150
GW-M06-1	06/21/90	1.0	H90-06.155	A	ug/L		2	3
GW-M6-2	11/06/90	1.0	H90-11.46	A	ug/L		2	3
GW-M07-1	06/21/90	1.0	H90-06.155	A	ug/L		2	3
GW-M7-2	11/06/90	1.0	H90-11.46	A	ug/L		2	3
GW-M08-1	06/21/90	1.0	H90-06.155	A	ug/L		2	3
GW-M8-2	11/06/90	1.0	H90-11.46	A	ug/L		2	3
GW-GW1-2	11/08/90	1.0	H90-11.46	A	ug/L		5.5	30
GW-GW2-2	11/08/90	1.0	H90-11.46	A	ug/L		2	3
GW-GW3-2	11/08/90	1.0	H90-11.46	A	ug/L		2.8	3
GW-GW4-2	11/12/90	1.0	H90-11.62	A	ug/L		2	3
GW-GW5-2	11/12/90	1.0	H90-11.62	A	ug/L		2	3
GW-GW6-2	11/07/90	1.0	H90-11.46	A	ug/L		2	3
GW-GW7-2	11/12/90	1.0	H90-11.62	A	ug/L		2	3
GW-GW8-2	11/08/90	1.0	H90-11.46	A	ug/L		2	3
GW-GW9-2	11/09/90	1.0	H90-11.46	A	ug/L		2	3
GW-GW10-2	11/08/90	1.0	H90-11.46	A	ug/L		2	3
GW-GW11-2	11/09/90	1.0	H90-11.48	A	ug/L		2	3
GW-GW12-2	11/07/90	1.0	H90-11.46	A	ug/L		2	3
GW-GW13-2	11/08/90	1.0	H90-11.46	A	ug/L		2	3
GW-GW14-2	11/07/90	1.0	H90-11.46	A	ug/L		2	3
GW-GW15-2	11/08/90	1.0	H90-11.46	A	ug/L		2	3
GW-GW18-2	11/09/90	1.0	H90-11.46	A	ug/L		2	3
GW-GW17-2	11/08/90	1.0	H90-11.46	A	ug/L		2	3
GW-MT. MORIAH	11/13/90	1.0	H90-11.62	A	ug/L		2	3
GW-BONTEMPO	11/13/90	1.0	H90-11.62	A	ug/L		2	3
GW-M33-1	06/25/90	1.0	H90-06.170	A	ug/L	Rinsate Blank	2	3
GW-M34-1	06/25/90	10.0	H90-06.170	A	ug/L	Trip Blank	26	30
GW-M35-1	06/25/90	1.0	H90-06.170	A	ug/L	Trip Blank	2	2.8
TRIP BLANK	06/20/90	1.0	H90-06.155	A	ug/L	Trip Blank	2	3
GW-W91-1	06/22/90	1.0	H90-06.155	A	ug/L	Field Blank	2	2.4
GW-M30-1	06/22/90	1.0	H90-06.155	A	ug/L	Rinsate Blank	2	3
GW-M31-1	06/22/90	1.0	H90-06.155	A	ug/L	Trip Blank	2	1.9
GW-M31-2	11/08/90	1.0	H90-11.46	A	ug/L	Trip Blank	1.1	1.9
GW-M32-2	11/09/90	1.0	H90-11.46	A	ug/L	Trip Blank	0.8	0.41
GW-M33-2	11/12/90	1.0	H90-11.62	A	ug/L	Trip Blank	1.6	1.1
GW-W8M-2	11/06/90	1.0	H90-11.46	A	ug/L	Field Blank	2.3	2.9
GW-W8P-2	11/09/90	1.0	H90-11.46	A	ug/L	Field Blank	1.2	0.51
GW-R10-2	11/06/90	1.0	H90-11.46	A	ug/L	Rinsate Blank	2.6	0.33
GW-R11-2	11/08/90	1.0	H90-11.46	A	ug/L	Rinsate Blank	1.1	0.65
GW-R12-2	11/13/90	1.0	H90-11.62	A	ug/L	Rinsate Blank	2	3
SW-100-01	07/12/90	1.0	H90-07.53	A	ug/L	Aqueous Bottle Blank	2	3

LOCATION	Chlorobenzene	Ethylbenzene	M-Xylene	O-Xylene	P-Xylene	1,2-Dichlorobenzene
GW-W01-1	3	3	6	3	6	4
GW-W1-2	3	3	6	3	6	5
GW-W02-1	3	5.2	28.0	33.0	28.0	4
GW-W2-2	3	9.4	36	63	36	18
GW-W03-1	3	3	6	3	8	4
GW-W90-1	3	3	6	3	6	4
GW-W3-2	3	3	6	20	6	5
GW-W04-1	30	30	60	30	60	40
GW-W4-2	3	3	6	9.2	6	7.3
GW-W9Q-2	30	30	60	30	60	21
GW-W05-1	15	16.0	49.0	70.0	49.0	20
GW-W05-1	30	26	65	79	65	40
GW-W5-2	60	60	120	60	120	100
GW-W06-1	3	3	6	3	6	4
GW-W6-2	150	150	300	150	300	250
GW-W08-1	30	47	190	160	190	40
GW-W8-2	460	300	1700	1300	1700	1500
GW-W08-1	15000	160000	730000	400000	730000	20000
GW-W8-2	110000	83000	555000	320000	555000	53000
GW-W09-1	3	3	6	3	6	4
GW-W9-2	3	3	7.5	4.1	7.5	28
GW-W10-1	3	1.7	5.3	8.4	5.3	4
GW-W10-2	30	30	60	30	60	50
GW-W9P-2	30	30	60	30	60	50
GW-W11-1	3	3	6	3	6	4
GW-W11-2	3	3	6	3	6	6.9
GW-W13-1	30	30	60	30	60	40
GW-W13-1	30	30	60	30	60	40
GW-W13-2	60	60	120	60	120	100
GW-W014-1	3	3	6	3	6	4
GW-W14-2	3	3	6	3	6	5
GW-W15-1	3	5.5	23	20	23	4
GW-W93-1	3	6.4	29	25	29	4
GW-W15-1	3	5.2	22	19	22	4
GW-W15-2	60	60	120	60	120	100
GW-W016-1	3	3	6	3	6	4
GW-W16-2	3	3	6	3	6	7.8
GW-M01-1	3	3	6	3	6	4
GW-M1-2	3	3	6	3	6	5
GW-M02-1	3	3	6	3	6	4
GW-M2-2	3	3	6	3	6	5
GW-W9M-2	3	3	6	3	6	5
GW-M03-1	3	3	6	21.0	6	4
GW-M3-2	30	30	60	30	60	420
GW-M04-1	3	3	6	3	6	4
GW-M4-2	3	3	6	3	6	5

LOCATION	Chlorobenzene	Ethylbenzene	M-Xylene	O-Xylene	P-Xylene	1,2-Dichlorobenzene
GW-M05-1	3	3	6	3	6	4
GW-M5-2	160	150	300	150	300	1700
GW-M06-1	3	3	6	3	6	4
GW-M6-2	3	3	6	3	6	5
GW-M07-1	3	3	6	3	6	4
GW-M7-2	3	3	6	3	6	5
GW-M08-1	3	3	12.0	15.0	12.0	4
GW-M8-2	3	3	6	3.1	6	5
GW-GW1-2	3	17	75	62	75	7.7
GW-GW2-2	3	3	6	3.4	6	8.1
GW-GW3-2	3	3	6	3	6	5
GW-GW4-2	3	3	6	3	6	5
GW-GW5-2	3	3	6	3	6	7.2
GW-GW6-2	3	3	6	3	6	5
GW-GW7-2	3	3	8	3	6	6.7
GW-GW8-2	3	3	6	3	6	5
GW-GW9-2	3	3	6	3	8	5
GW-GW10-2	3	3	6	3	6	5
GW-GW11-2	3	3	10	10	10	5.8
GW-GW12-2	3	3	6	3	6	48
GW-GW13-2	3	3	6	3	6	5
GW-GW14-2	3	3	6	3	6	9.2
GW-GW15-2	3	3	6	3	6	5
GW-GW16-2	3	3	6	5.2	8	5
GW-GW17-2	3	3	6	3	6	15
GW-MT. MORIAH	3	3	6	3.2	6	5
GW-BONTEMPO	3	3	6	3	6	7.6
GW-M33-1	3	3	6	3	6	4
GW-M34-1	30	30	60	30	60	40
GW-M35-1	3	3	6	8.5	6	4
TRIP BLANK	3	3	6	3	6	4
GW-W91-1	3	3	6	3	6	4
GW-M30-1	3	3	6	3	6	4
GW-M31-1	3	3	6	3	6	4
GW-M31-2	2.4	2.5	2.8	2.3	2.8	5
GW-M32-2	3	3	0.77	3	0.77	5
GW-M33-2	1.1	1.7	3.9	1.9	3.9	13
GW-W8M-2	1.1	1.9	7.1	14	7.1	6.1
GW-W8P-2	0.54	0.48	0.96	0.5	0.96	2.2
GW-R10-2	3	3	0.41	0.38	0.41	5
GW-R11-2	0.65	0.6	1.1	0.57	1.1	2.3
GW-R12-2	3	3	6	3	6	5
SW-100-01	3	3	6	3	6	5

LOCATION	1,3-Dichlorobenzene	1,4-Dichlorobenzene
GW-W01-1	4	4
GW-W1-2	5	5
GW-W02-1	4	4
GW-W2-2	9.3	6.8
GW-W03-1	4	4
GW-W90-1	4	4
GW-W3-2	5.2	5
GW-W04-1	40	40
GW-W4-2	1.3	5
GW-W9Q-2	15	50
GW-W05-1	20	20
GW-W05-1	40	40
GW-W5-2	100	100
GW-W06-1	4	4
GW-W6-2	250	250
GW-W08-1	40	40
GW-W8-2	410	500
GW-W08-1	20000	20000
GW-W8-2	37000	150000
GW-W09-1	4	4
GW-W9-2	5	5
GW-W10-1	4	4
GW-W10-2	50	50
GW-W9P-2	50	50
GW-W11-1	4	4
GW-W11-2	5	5.2
GW-W13-1	40	40
GW-W13-1	40	40
GW-W13-2	100	100
GW-W014-1	4	4
GW-W14-2	5	5
GW-W15-1	4	4
GW-W93-1	4	4
GW-W15-1	4	4
GW-W15-2	100	100
GW-W016-1	4	4
GW-W16-2	5	6.1
GW-M01-1	4	4
GW-M1-2	5	5
GW-M02-1	4	4
GW-M2-2	5	5
GW-W9M-2	5	5
GW-M03-1	4	4
GW-M3-2	50	330
GW-M04-1	4	4
GW-M4-2	5	5

LOCATION	1,3-Dichlorobenzene	1,4-Dichlorobenzene
GW-M05-1	4	4
GW-M5-2	250	250
GW-M06-1	4	4
GW-M6-2	5	5
GW-M07-1	4	4
GW-M7-2	5	5
GW-M08-1	4	4
GW-M8-2	5	5
GW-GW1-2	16	5
GW-GW2-2	5	5
GW-GW3-2	5	5
GW-GW4-2	5	5
GW-GW5-2	5	5
GW-GW6-2	5	5
GW-GW7-2	5	5
GW-GW8-2	5	5
GW-GW9-2	5	5
GW-GW10-2	5	5
GW-GW11-2	6.8	6.2
GW-GW12-2	6.7	45
GW-GW13-2	5	5.8
GW-GW14-2	5	5.9
GW-GW15-2	5	5
GW-GW16-2	5.7	5.1
GW-GW17-2	5	24
GW-MT. MORIAH	3	5
GW-BONTEMPO	6.6	7.3
GW-M33-1	4	4
GW-M34-1	40	40
GW-M35-1	4	4
TRIP BLANK	4	4
GW-W91-1	4	4
GW-M30-1	4	4
GW-M31-1	4	4
GW-M31-2	1.5	3.7
GW-M32-2	5	3.9
GW-M33-2	5	5
GW-W8M-2	2.8	2
GW-W8P-2	2.4	6.2
GW-R10-2	5	5
GW-R11-2	5	5.4
GW-R12-2	5	5
SW-100-01	5	5

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LOCATION/WELL	DATE	WORK ORDER	UNITS	COMMENTS	Fuel Oil #2	Fuel Oil #4
GW-W01-1	06/26/90	M90-06.125	mg/L		0.100	0.100
GW-W1-2	11/07/90	M90-11.39	mg/L		0.100	0.121
GW-WO2-1	06/22/90	M90-06.101	mg/L		0.100	0.100
GW-W2-2	11/09/90	M90-11.39	mg/L		0.500	4.860
GW-WO3-1	06/22/90	M90-06.101	mg/L		0.100	0.100
GW-W90-1	06/22/90	M90-06.101	mg/L	Field Duplicate of GW-W03-1	0.100	0.100
GW-W3-2	11/07/90	M90-11.39	mg/L		0.100	0.100
GW-W04-1	06/25/90	M90-06.117	mg/L		100.000	100.000
GW-W4-2	11/11/90	M90-11.61	mg/L		0.500	2.650
GW-W9Q-2	11/11/90	M90-11.61	mg/L	Field Duplicate of GW-W4-2	0.500	1.000
GW-WO5-1	06/22/90	M90-06.101	mg/L		500.000	500.000
GW-W5-2	11/11/90	M90-11.61	mg/L		2.000	5.540
GW-W05-1	06/25/90	M90-07.14	mg/L	Product		
GW-WO6-1	06/22/90	M90-06.101	mg/L		0.400	0.400
GW-W6-2	11/07/90	M90-11.39	mg/L		40.000	305.000
GW-W08-1	06/25/90	M90-06.117	mg/L		10.000	10.000
GW-W8-2	11/11/90	M90-11.61	mg/L		40.000	192.000
GW-W08-1	06/28/90	M90-07.14	mg/L	Product		
GW-W8-2	11/11/90	M90-11.79	mg/L	Product		
GW-W09-1	06/25/90	M90-06.117	mg/L		0.100	0.100
GW-W9-2	11/12/90	M90-11.61	mg/L		0.100	0.100
GW-W10-1	06/26/90	M90-06.125	mg/L		1.000	1.000
GW-W10-2	11/09/90	M90-11.39	mg/L		1.000	7.470
GW-W9P-2	11/09/90	M90-11.39	mg/L	Field Duplicate of GW-W10-2	2.500	14.300
GW-W11-1	06/25/90	M90-06.117	mg/L		0.100	0.100
GW-W11-2	11/12/90	M90-11.61	mg/L		5.000	16.200
GW-W13-1	06/25/90	M90-06.117	mg/L		0.100	0.100
GW-W13-2	11/11/90	M90-11.61	mg/L		5.000	20.500
GW-WO14-1	06/21/90	M90-06.101	mg/L		0.100	0.100
GW-W14-2	11/12/90	M90-11.61	mg/L		0.100	0.100
GW-W15-1	06/25/90	M90-06.125	mg/L		100.000	100.000
GW-W93-1	06/25/90	M90-06.125	mg/L	Field Duplicate of GW-W15-1	100.000	1000.000
GW-W15-2	11/11/90	M90-11.61	mg/L		5.000	59.500
GW-WO16-1	06/21/90	M90-06.101	mg/L		0.100	0.100
GW-W16-2	11/12/90	M90-11.61	mg/L		0.100	0.100
GW-MO1-1	06/21/90	M90-06.101	mg/L		0.100	0.565
GW-M1-2	11/07/90	M90-11.39	mg/L		0.100	1.340
GW-MO2-1	06/21/90	M90-06.101	mg/L		0.100	0.100
GW-M2-2	11/06/90	M90-11.39	mg/L		0.100	0.721
GW-W9M-2	11/06/90	M90-11.39	mg/L	Field Duplicate of GW-M2-2	0.100	0.672
GW-MO3-1	06/21/90	M90-06.101	mg/L		0.100	0.100
GW-M3-2	11/06/90	M90-11.39	mg/L		0.100	0.186
GW-MO4-1	06/20/90	M90-06.101	mg/L		0.100	0.100
GW-M4-2	11/06/90	M90-11.39	mg/L		0.100	0.122
GW-MO5-1	06/20/90	M90-06.101	mg/L		1.600	3.850
GW-M5-2	11/06/90	M90-11.39	mg/L		0.400	3.330
GW-MO6-1	06/21/90	M90-06.101	mg/L		0.100	0.100
GW-M6-2	11/06/90	M90-11.39	mg/L		0.200	1.520
GW-MO7-1	06/21/90	M90-06.101	mg/L		0.100	0.100
GW-M7-2	11/06/90	M90-11.39	mg/L		0.100	0.100
GW-MO8-1	06/21/90	M90-06.101	mg/L		0.100	0.100
GW-M8-2	11/06/90	M90-11.39	mg/L		0.500	4.390
GW-GW1-2	11/08/90	M90-11.39	mg/L		4.000	37.100
GW-GW2-2	11/08/90	M90-11.39	mg/L		0.500	2.580
GW-GW3-2	11/08/90	M90-11.39	mg/L		0.100	0.100
GW-GW4-2	11/12/90	M90-11.61	mg/L		0.100	0.100
GW-GW5-2	11/12/90	M90-11.61	mg/L		0.100	0.100
GW-GW6-2	11/07/90	M90-11.39	mg/L		0.100	0.100
GW-GW7-2	11/12/90	M90-11.61	mg/L		0.100	0.100
GW-GW8-2	11/08/90	M90-11.39	mg/L		0.100	0.100

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LOCATION/WELL	DATE	WORK ORDER	UNITS	COMMENTS	Fuel Oil #2	Fuel Oil #4
GW-GW9-2	11/09/90	M90-11.39	mg/L		0.100	0.100
GW-GW10-2	11/08/90	M90-11.39	mg/L		0.100	0.100
GW-GW11-2	11/09/90	M90-11.39	mg/L		0.500	0.461
GW-GW12-2	11/07/90	M90-11.39	mg/L		0.100	0.100
GW-GW13-2	11/08/90	M90-11.39	mg/L		0.100	0.100
GW-GW14-2	11/07/90	M90-11.39	mg/L		0.100	0.100
GW-GW15-2	11/08/90	M90-11.39	mg/L		0.100	0.100
GW-GW16-2	11/09/90	M90-11.39	mg/L		0.100	0.486
GW-GW17-2	11/08/90	M90-11.39	mg/L		0.100	0.100
GW-MT MORIAH	11/12/90	M90-11.61	mg/L		0.100	0.100
GW-BONTEMPO	11/12/90	M90-11.61	mg/L		0.100	0.100
GW15	12/07/90	M90-12.64	mg/L	12 HRS	0.100	0.100
GW15	12/08/90	M90-12.64	mg/L	24 HRS	0.100	0.100
GW15	12/08/90	M90-12.64	mg/L	36 HRS	0.100	0.100
GW15	12/09/90	M90-12.64	mg/L	46 HRS	0.100	0.100
GW-M30-1	06/22/90	M90-06.101	mg/L	Rinsate Blank	0.100	0.100
GW-M33-1	06/25/90	M90-06.117	mg/L	Rinsate Blank	0.100	0.100
GW-R10-2	11/06/90	M90-11.39	mg/L	Rinsate Blank	0.100	0.100
GW-R11-2	11/08/90	M90-11.39	mg/L	Rinsate Blank	0.100	0.100
GW-R12-2	11/12/90	M90-11.61	mg/L	Rinsate Blank	0.100	0.100

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LOCATION/WELL	Fuel Oil #6	Kerosene
GW-W01-1	0.269	0.100
GW-W1-2	0.100	0.100
GW-WO2-1	0.100	0.100
GW-W2-2	0.500	0.500
GW-WO3-1	0.100	0.100
GW-W90-1	0.100	0.100
GW-W3-2	0.100	0.100
GW-W04-1	639.000	100.000
GW-W4-2	0.500	0.500
GW-W9Q-2	4.330	1.000
GW-WO5-1	4250.000	500.000
GW-W5-2	2.000	0.500
GW-W05-1		
GW-WO6-1	3.040	0.100
GW-W6-2	40.000	40.000
GW-W08-1	22.700	0.100
GW-W8-2	40.000	10.000
GW-W08-1		
GW-W8-2		
GW-W09-1	0.100	0.100
GW-W9-2	0.100	0.100
GW-W10-1	16.700	1.000
GW-W10-2	1.000	0.500
GW-W9P-2	2.500	0.500
GW-W11-1	5.140	0.100
GW-W11-2	5.000	0.500
GW-W13-1	911.000	0.100
GW-W13-2	5.000	0.500
GW-WO14-1	0.100	0.100
GW-W14-2	0.100	0.100
GW-W15-1	5080.000	100.000
GW-W93-1	6500.000	100.000
GW-W15-2	5.000	1.000
GW-WO16-1	0.100	0.100
GW-W16-2	0.100	0.100
GW-MO1-1	0.100	0.100
GW-M1-2	0.100	0.100
GW-MO2-1	0.100	0.100
GW-M2-2	0.100	0.100
GW-W9M-2	0.100	0.100
GW-MO3-1	0.100	0.100
GW-M3-2	0.100	0.100
GW-MO4-1	0.396	0.100
GW-M4-2	0.100	0.100
GW-MO5-1	1.650	0.100
GW-M5-2	0.400	0.100
GW-MO6-1	0.100	0.100
GW-M6-2	0.200	0.100
GW-MO7-1	0.100	0.100
GW-M7-2	0.100	0.100
GW-MO8-1	0.420	0.100
GW-M8-2	0.500	0.500
GW-GW1-2	4.000	0.500
GW-GW2-2	0.500	0.100
GW-GW3-2	0.100	0.100
GW-GW4-2	0.100	0.100
GW-GW5-2	0.100	0.100
GW-GW6-2	0.100	0.100
GW-GW7-2	0.100	0.100
GW-GW8-2	0.100	0.100

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LOCATION/WELL	Fuel Oil #6	Kerosene
GW-GW9-2	0.100	0.100
GW-GW10-2	0.100	0.100
GW-GW11-2	0.500	0.500
GW-GW12-2	0.100	0.100
GW-GW13-2	0.100	0.100
GW-GW14-2	0.100	0.100
GW-GW15-2	0.100	0.100
GW-GW16-2	0.100	0.100
GW-GW17-2	0.100	0.100
GW-MT MORIAH	0.100	0.100
GW-BONTEMPO	0.100	0.100
GW15	0.100	0.100
GW15	0.100	0.100
GW15	0.100	0.100
GW15	0.100	0.100
GW-M30-1	0.100	0.100
GW-M33-1	0.100	0.100
GW-R10-2	0.100	0.100
GW-R11-2	0.100	0.100
GW-R12-2	0.100	0.100

POLYNUCLEAR AROMATIC HYDROCARBONS (PAHs)
IN GROUND WATER

LOCATION/WELL	DATE	WORK ORDER	A/B LEVEL	UNITS	COMMENTS	Carbazole	Naphthalene
GW-W01-1	06/26/90	M90-06.125	B	ug/L		20	23.1
GW-W1-2	11/07/90	M90-11.39	A	ug/L		4.75	97.3
GW-WO2-1	06/22/90	M90-06.101	B	ug/L		200	100
GW-W2-2	11/09/90	M90-11.39	A	ug/L		27.6	66.0
GW-WO3-1	06/22/90	M90-06.101	B	ug/L		2	2
GW-W90-1	06/22/90	M90-06.101	B	ug/L	Field Duplicate of GW-W03-1	2	7.0
GW-W3-2	11/07/90	M90-11.39	A	ug/L		2.00	2.00
GW-W04-1	06/25/90	M90-06.117	BA	ug/L		199	4380
GW-W4-2	11/11/90	M90-11.61	BA	ug/L		12.1	4.21
GW-W9Q-2	11/11/90	M90-11.61	BA	ug/L	Field Duplicate of GW-0W4-2	2.16	2.98
GW-WO5-1	06/22/90	M90-06.101	B	ug/L		2000	15700
GW-W5-2	11/11/90	M90-11.61	BA	ug/L		29.6	76.8
GW-W05-1	06/25/90	M90-07.14	B	ug/kg	Product	5000000	1720000
GW-WO6-1	06/25/90	M90-06.101	B	ug/L		2	11.7
GW-W6-2	11/07/90	M90-11.39	A	ug/L		35.8	714
GW-W08-1	06/25/90	M90-06.117	BA	ug/L		32200	285000
GW-W8-2	11/11/90	M90-11.61	BA	ug/L		88.0	452
GW-W08-1	06/28/90	M90-07.14	B	ug/kg	Product	5910000	50600000
GW-W8-2	11/11/90	M90-11.79	BA	ug/kg	Product	69100	57000
GW-W09-1	06/25/90	M90-06.117	BA	ug/L		20	24.1
GW-W9-2	11/12/90	M90-11.61	BA	ug/L		2.00	2.00
GW-W10-1	06/26/90	M89-06.125	B	ug/L		8.15	35.3
GW-W10-2	11/09/90	M90-11.39	A	ug/L		3.08	48.6
GW-W9P-2	11/09/90	M90-11.39	A	ug/L	Field Duplicate of GW-W10-2	7.81	32.5
GW-W11-1	06/25/90	M90-06.117	BA	ug/L		2	2
GW-W11-2	11/12/90	M90-11.61	BA	ug/L		8.61	53.6
GW-W13-1	06/25/90	M90-06.117	BA	ug/L		2000	14200
GW-W13-2	11/11/90	M90-11.61	BA	ug/L		18.9	57.0
GW-WO14-1	06/21/90	M90-06.101	B	ug/L		2	2
GW-W14-2	11/12/90	M90-11.61	BA	ug/L		2.00	3.77
GW-W15-1	06/25/90	M90-06.125	B	ug/L		800	1060
GW-W93-1	06/25/90	M90-06.125	B	ug/L	Field Duplicate of GW-W15-1	800	1460
GW-W15-2	11/11/90	M90-11.61	BA	ug/L		27.8	118
GW-WO16-1	06/21/90	M90-06.101	B	ug/L		2	2
GW-W16-2	11/12/90	M90-11.61	BA	ug/L		2.00	2.00
GW-MO1-1	06/21/90	M90-06.101	B	ug/L		2	9.12
GW-M1-2	11/07/90	M90-11.39	A	ug/L		3.14	106
GW-MO2-1	06/21/90	M90-06.101	B	ug/L		2.88	26.2
GW-M2-2	11/06/90	M90-11.39	A	ug/L		3.68	71.5
GW-W9M-2	11/06/90	M90-11.39	A	ug/L	Field Duplicate of GW-M2-2	4.61	56.6
GW-MO3-1	06/21/90	M90-06.101	B	ug/L		5.93	50.8
GW-M3-2	11/06/90	M90-11.39	A	ug/L		11.4	14.2
GW-MO4-1	06/20/90	M90-06.101	B	ug/L		2	59.2
GW-M4-2	11/06/90	M90-11.39	A	ug/L		2.00	3.32
GW-MO5-1	06/20/90	M90-06.101	B	ug/L		2	209
GW-M5-2	11/06/90	M90-11.39	A	ug/L		2.00	13.4
GW-MO6-1	06/21/90	M90-06.101	B	ug/L		2	2
GW-M6-2	11/06/90	M90-11.39	A	ug/L		2.00	2.00
GW-MO7-1	06/21/90	M90-06.101	B	ug/L		2	12.9
GW-M7-2	11/06/90	M90-11.39	A	ug/L		2.84	33.9
GW-MO8-1	06/21/90	M90-06.101	B	ug/L		26.2	145
GW-M8-2	11/06/90	M90-11.39	A	ug/L		13.9	8.80
GW-GW1-2	11/08/90	M90-11.39	A	ug/L		62.3	348
GW-GW2-2	11/08/90	M90-11.39	A	ug/L		1.29	3.49
GW-GW3-2	11/08/90	M90-11.39	A	ug/L		2.00	2.00
GW-GW4-2	11/12/90	M90-11.61	BA	ug/L		2.00	2.00
GW-GW5-2	11/12/90	M90-11.61	BA	ug/L		2.44	10.5
GW-GW6-2	11/07/90	M90-11.39	A	ug/L		2.00	2.00
GW-GW7-2	11/12/90	M90-11.61	BA	ug/L		2.00	2.00
GW-GW8-2	11/08/90	M90-11.39	A	ug/L		2.00	3.38
GW-GW9-2	11/09/90	M90-11.39	A	ug/L		2.00	2.00

POLYNUCLEAR AROMATIC HYDROCARBONS (PAHs)
IN GROUND WATER

GW-GW10-2	11/08/90	M90-11.39	A	ug/L		2.00	2.00
GW-GW11-2	11/09/90	M90-11.39	A	ug/L		11.4	93.6
GW-GW12-2	11/07/90	M90-11.39	A	ug/L		2.00	2.00
GW-GW13-2	11/08/90	M90-11.39	A	ug/L		2.00	2.00
GW-GW14-2	11/07/90	M90-11.39	A	ug/L		2.00	2.00
GW-GW15-2	11/08/90	M90-11.39	A	ug/L		2.00	2.00
GW-GW16-2	11/09/90	M90-11.39	A	ug/L		2.00	2.15
GW-GW17-2	11/08/90	M90-11.39	A	ug/L		2.00	2.00
GW-MT MORIAH	11/12/90	M90-11.61	BA	ug/L		2.00	2.00
GW-BONTEMPO	11/12/90	M90-11.61	BA	ug/L		2.00	2.00
GW15	12/07/90	M90-12.64		ug/L	12 HRS		
GW15	12/08/90	M90-12.64		ug/L	24 HRS		
GW15	12/08/90	M90-12.64		ug/L	36 HRS		
GW15	12/09/90	M90-12.64		ug/L	46 HRS		
GW-M30-1	06/22/90	M90-06.101	B	ug/L	Rinsate Blank	2	2
GW-M33-1	06//25/90	M90-06.117	BA	ug/L	Rinsate Blank	2	2
GW-R10-2	11/06/90	M90-11.39	A	ug/L	Rinsate Blank	2.00	2.00
GW-R11-2	11/08/90	M90-11.39	A	ug/L	Rinsate Blank	2.00	2.00
GW-R12-2	11/12/90	M90-11.61	BA	ug/L	Rinsate Blank	2.00	2.00
GW-GWP-2	11/07/90	M90-11.39	A	ug/L	PE	2.02	50.9
SW-100-1	07/12/90	M90-07.44	B	ug/L	Aqueous Bottle	2	2

POLYNUCLEAR AROMATIC HYDROCARBONS (PAHs)
IN GROUND WATER

LOCATION/WELL	DATE	WORK ORDER	A/B LEVEL	UNITS	COMMENTS	Acenaphthylene
GW-W01-1	06/26/90	M90-06.125	B	ug/L		250
GW-W1-2	11/07/90	M90-11.39	A	ug/L		380
GW-WO2-1	06/22/90	M90-06.101	B	ug/L		237
GW-W2-2	11/09/90	M90-11.39	A	ug/L		771
GW-WO3-1	06/22/90	M90-06.101	B	ug/L		2
GW-W90-1	06/22/90	M90-06.101	B	ug/L	Field Duplicate of GW-W03-1	2
GW-W3-2	11/07/90	M90-11.39	A	ug/L		2.00
GW-W04-1	06/25/90	M90-06.117	BA	ug/L		201000
GW-W4-2	11/11/90	M90-11.61	BA	ug/L		224
GW-W9Q-2	11/11/90	M90-11.61	BA	ug/L	Field Duplicate of GW-0W4-2	196
GW-WO5-1	06/22/90	M90-06.101	B	ug/L		51100
GW-W5-2	11/11/90	M90-11.61	BA	ug/L		384
GW-W05-1	06/25/90	M90-07.14	B	ug/kg	Product	5000000
GW-WO6-1	06/25/90	M90-06.101	B	ug/L		28.9
GW-W6-2	11/07/90	M90-11.39	A	ug/L		5580
GW-W08-1	06/25/90	M90-06.117	BA	ug/L		2480000
GW-W8-2	11/11/90	M90-11.61	BA	ug/L		1120
GW-W08-1	06/28/90	M90-07.14	B	ug/kg	Product	328000000
GW-W8-2	11/11/90	M90-11.79	BA	ug/kg	Product	843000
GW-W09-1	06/25/90	M90-06.117	BA	ug/L		32.7
GW-W9-2	11/12/90	M90-11.61	BA	ug/L		2.00
GW-W10-1	06/26/90	M89-06.125	B	ug/L		200
GW-W10-2	11/09/90	M90-11.39	A	ug/L		275
GW-W9P-2	11/09/90	M90-11.39	A	ug/L	Field Duplicate of GW-W10-2	551
GW-W11-1	06/25/90	M90-06.117	BA	ug/L		2
GW-W11-2	11/12/90	M90-11.61	BA	ug/L		360
GW-W13-1	06/25/90	M90-06.117	BA	ug/L		25500
GW-W13-2	11/11/90	M90-11.61	BA	ug/L		425
GW-WO14-1	06/21/90	M90-06.101	B	ug/L		2
GW-W14-2	11/12/90	M90-11.61	BA	ug/L		28.8
GW-W15-1	06/25/90	M90-06.125	B	ug/L		7560
GW-W93-1	06/25/90	M90-06.125	B	ug/L	Field Duplicate of GW-W15-1	11100
GW-W15-2	11/11/90	M90-11.61	BA	ug/L		435
GW-WO16-1	06/21/90	M90-06.101	B	ug/L		2
GW-W16-2	11/12/90	M90-11.61	BA	ug/L		2.00
GW-MO1-1	06/21/90	M90-06.101	B	ug/L		45.5
GW-M1-2	11/07/90	M90-11.39	A	ug/L		464
GW-MO2-1	06/21/90	M90-06.101	B	ug/L		146
GW-M2-2	11/06/90	M90-11.39	A	ug/L		245
GW-W9M-2	11/06/90	M90-11.39	A	ug/L	Field Duplicate of GW-M2-2	201
GW-MO3-1	06/21/90	M90-06.101	B	ug/L		58.3
GW-M3-2	11/06/90	M90-11.39	A	ug/L		1240
GW-MO4-1	06/20/90	M90-06.101	B	ug/L		15.6
GW-M4-2	11/06/90	M90-11.39	A	ug/L		355
GW-MO5-1	06/20/90	M90-06.101	B	ug/L		126
GW-M5-2	11/06/90	M90-11.39	A	ug/L		1280
GW-MO6-1	06/21/90	M90-06.101	B	ug/L		16
GW-M6-2	11/06/90	M90-11.39	A	ug/L		617
GW-MO7-1	06/21/90	M90-06.101	B	ug/L		27.7
GW-M7-2	11/06/90	M90-11.39	A	ug/L		236
GW-MO8-1	06/21/90	M90-06.101	B	ug/L		200
GW-M8-2	11/06/90	M90-11.39	A	ug/L		1730
GW-GW1-2	11/08/90	M90-11.39	A	ug/L		1700
GW-GW2-2	11/08/90	M90-11.39	A	ug/L		204
GW-GW3-2	11/08/90	M90-11.39	A	ug/L		2.00
GW-GW4-2	11/12/90	M90-11.61	BA	ug/L		2.00
GW-GW5-2	11/12/90	M90-11.61	BA	ug/L		15.8
GW-GW6-2	11/07/90	M90-11.39	A	ug/L		2.00
GW-GW7-2	11/12/90	M90-11.61	BA	ug/L		2.00
GW-GW8-2	11/08/90	M90-11.39	A	ug/L		2.00
GW-GW9-2	11/09/90	M90-11.39	A	ug/L		2.00

POLYNUCLEAR AROMATIC HYDROCARBONS (PAHs)
IN GROUND WATER

GW-GW10-2	11/08/90	M90-11.39	A	ug/L		2.00
GW-GW11-2	11/09/90	M90-11.39	A	ug/L		134
GW-GW12-2	11/07/90	M90-11.39	A	ug/L		2.00
GW-GW13-2	11/08/90	M90-11.39	A	ug/L		2.00
GW-GW14-2	11/07/90	M90-11.39	A	ug/L		5.78
GW-GW15-2	11/08/90	M90-11.39	A	ug/L		2.00
GW-GW16-2	11/09/90	M90-11.39	A	ug/L		566
GW-GW17-2	11/08/90	M90-11.39	A	ug/L		2.00
GW-MT MORIAH	11/12/90	M90-11.61	BA	ug/L		2.00
GW-BONTEMPO	11/12/90	M90-11.61	BA	ug/L		2.00
GW15	12/07/90	M90-12.64		ug/L	12 HRS	
GW15	12/08/90	M90-12.64		ug/L	24 HRS	
GW15	12/08/90	M90-12.64		ug/L	36 HRS	
GW15	12/09/90	M90-12.64		ug/L	46 HRS	
GW-M30-1	06/22/90	M90-06.101	B	ug/L	Rinsate Blank	2
GW-M33-1	06//25/90	M90-06.117	BA	ug/L	Rinsate Blank	2
GW-R10-2	11/06/90	M90-11.39	A	ug/L	Rinsate Blank	2.00
GW-R11-2	11/08/90	M90-11.39	A	ug/L	Rinsate Blank	2.00
GW-R12-2	11/12/90	M90-11.61	BA	ug/L	Rinsate Blank	2.00
GW-GWP-2	11/07/90	M90-11.39	A	ug/L	PE	2.02
SW-100-1	07/12/90	M90-07.44	B	ug/L	Aqueous Bottle	2

POLYNUCLEAR AROMATIC HYDROCARBONS (PAHs)
IN GROUND WATER

LOCATION/WELL	DATE	WORK ORDER	A/B LEVEL	UNITS	COMMENTS	Acenaphthene	Fluorene
GW-W01-1	06/26/90	M90-06.125	B	ug/L		20	4.55
GW-W1-2	11/07/90	M90-11.39	A	ug/L		42.1	22.2
GW-WO2-1	06/22/90	M90-06.101	B	ug/L		241	283
GW-W2-2	11/09/90	M90-11.39	A	ug/L		111	84.1
GW-WO3-1	06/22/90	M90-06.101	B	ug/L		2	0.777
GW-W90-1	06/22/90	M90-06.101	B	ug/L	Field Duplicate of GW-W03-1	2	1.29
GW-W3-2	11/07/90	M90-11.39	A	ug/L		2.00	0.432
GW-W04-1	06/25/90	M90-06.117	BA	ug/L		200000	68900
GW-W4-2	11/11/90	M90-11.61	BA	ug/L		282	27.4
GW-W9Q-2	11/11/90	M90-11.61	BA	ug/L	Field Duplicate of GW-0W4-2	93.4	14.9
GW-WO5-1	06/22/90	M90-06.101	B	ug/L		20000	36000
GW-W5-2	11/11/90	M90-11.61	BA	ug/L		20.0	91.9
GW-W05-1	06/25/90	M90-07.14	B	ug/kg	Product	5000000	2190000
GW-WO6-1	06/25/90	M90-06.101	B	ug/L		25.9	37
GW-W6-2	11/07/90	M90-11.39	A	ug/L		439	1660
GW-W08-1	06/25/90	M90-06.117	BA	ug/L		800000	551000
GW-W8-2	11/11/90	M90-11.61	BA	ug/L		20.0	330
GW-W08-1	06/28/90	M90-07.14	B	ug/kg	Product	390000000	4E+07
GW-W8-2	11/11/90	M90-11.79	BA	ug/kg	Product	661000	110000
GW-W09-1	06/25/90	M90-06.117	BA	ug/L		20	3.88
GW-W9-2	11/12/90	M90-11.61	BA	ug/L		2.00	0.200
GW-W10-1	06/26/90	M89-06.125	B	ug/L		200	68.3
GW-W10-2	11/09/90	M90-11.39	A	ug/L		17.8	80.9
GW-W9P-2	11/09/90	M90-11.39	A	ug/L	Field Duplicate of GW-W10-2	73.6	130
GW-W11-1	06/25/90	M90-06.117	BA	ug/L		2	0.464
GW-W11-2	11/12/90	M90-11.61	BA	ug/L		393	617
GW-W13-1	06/25/90	M90-06.117	BA	ug/L		20000	5980
GW-W13-2	11/11/90	M90-11.61	BA	ug/L		55.9	128
GW-WO14-1	06/21/90	M90-06.101	B	ug/L		2	0.648
GW-W14-2	11/12/90	M90-11.61	BA	ug/L		2.00	1.22
GW-W15-1	06/25/90	M90-06.125	B	ug/L		24100	2970
GW-W93-1	06/25/90	M90-06.125	B	ug/L	Field Duplicate of GW-W15-1	8000	4320
GW-W15-2	11/11/90	M90-11.61	BA	ug/L		5.83	95.6
GW-WO16-1	06/21/90	M90-06.101	B	ug/L		2	0.2
GW-W16-2	11/12/90	M90-11.61	BA	ug/L		2.00	0.200
GW-MO1-1	06/21/90	M90-06.101	B	ug/L		19	7.64
GW-M1-2	11/07/90	M90-11.39	A	ug/L		58.6	35.8
GW-MO2-1	06/21/90	M90-06.101	B	ug/L		18.6	12.9
GW-M2-2	11/06/90	M90-11.39	A	ug/L		61.6	20.7
GW-W9M-2	11/06/90	M90-11.39	A	ug/L	Field Duplicate of GW-M2-2	16.3	12.8
GW-MO3-1	06/21/90	M90-06.101	B	ug/L		37.4	27.6
GW-M3-2	11/06/90	M90-11.39	A	ug/L		2.00	87.1
GW-MO4-1	06/20/90	M90-06.101	B	ug/L		2	45200
GW-M4-2	11/06/90	M90-11.39	A	ug/L		23.6	17.5
GW-MO5-1	06/20/90	M90-06.101	B	ug/L		13.1	77.4
GW-M5-2	11/06/90	M90-11.39	A	ug/L		181	155
GW-MO6-1	06/21/90	M90-06.101	B	ug/L		17.5	26.8
GW-M6-2	11/06/90	M90-11.39	A	ug/L		2.00	284
GW-MO7-1	06/21/90	M90-06.101	B	ug/L		81.5	4.08
GW-M7-2	11/06/90	M90-11.39	A	ug/L		8.66	6.24
GW-MO8-1	06/21/90	M90-06.101	B	ug/L		200	9.06
GW-M8-2	11/06/90	M90-11.39	A	ug/L		2.00	78.2
GW-GW1-2	11/08/90	M90-11.39	A	ug/L		267	207
GW-GW2-2	11/08/90	M90-11.39	A	ug/L		200	48.9
GW-GW3-2	11/08/90	M90-11.39	A	ug/L		2.00	0.200
GW-GW4-2	11/12/90	M90-11.61	BA	ug/L		2.00	0.200
GW-GW5-2	11/12/90	M90-11.61	BA	ug/L		9.22	7.67
GW-GW6-2	11/07/90	M90-11.39	A	ug/L		2.00	0.200
GW-GW7-2	11/12/90	M90-11.61	BA	ug/L		2.00	0.200
GW-GW8-2	11/08/90	M90-11.39	A	ug/L		2.00	0.234
GW-GW9-2	11/09/90	M90-11.39	A	ug/L		2.00	0.200

POLYNUCLEAR AROMATIC HYDROCARBONS (PAHs)
IN GROUND WATER

GW-GW10-2	11/08/90	M90-11.39	A	ug/L		2.00	0.200
GW-GW11-2	11/09/90	M90-11.39	A	ug/L		44.5	18.8
GW-GW12-2	11/07/90	M90-11.39	A	ug/L		2.00	0.200
GW-GW13-2	11/08/90	M90-11.39	A	ug/L		2.35	0.640
GW-GW14-2	11/07/90	M90-11.39	A	ug/L		2.00	0.305
GW-GW15-2	11/08/90	M90-11.39	A	ug/L		2.00	0.200
GW-GW16-2	11/09/90	M90-11.39	A	ug/L		93.9	95.0
GW-GW17-2	11/08/90	M90-11.39	A	ug/L		2.00	0.200
GW-MT MORIAH	11/12/90	M90-11.61	BA	ug/L		2.00	0.200
GW-BONTEMPO	11/12/90	M90-11.61	BA	ug/L		2.00	0.200
GW15	12/07/90	M90-12.64		ug/L	12 HRS		
GW15	12/08/90	M90-12.64		ug/L	24 HRS		
GW15	12/08/90	M90-12.64		ug/L	36 HRS		
GW15	12/09/90	M90-12.64		ug/L	46 HRS		
GW-M30-1	06/22/90	M90-06.101	B	ug/L	Rinsate Blank	2	0.2
GW-M33-1	06//25/90	M90-06.117	BA	ug/L	Rinsate Blank	2	0.28
GW-R10-2	11/06/90	M90-11.39	A	ug/L	Rinsate Blank	2.00	0.200
GW-R11-2	11/08/90	M90-11.39	A	ug/L	Rinsate Blank	2.00	0.200
GW-R12-2	11/12/90	M90-11.61	BA	ug/L	Rinsate Blank	2.00	0.200
GW-GWP-2	11/07/90	M90-11.39	A	ug/L	PE	2.02	0.202
SW-100-1	07/12/90	M90-07.44	B	ug/L	Aqueous Bottle	2	0.2

POLYNUCLEAR AROMATIC HYDROCARBONS (PAHs)
IN GROUND WATER

LOCATION/WELL	DATE	WORK ORDER	A/B LEVEL	UNITS	COMMENTS	Phenanthrene	Anthracene
GW-W01-1	06/26/90	M90-06.125	B	ug/L		0.5	0.5
GW-W1-2	11/07/90	M90-11.39	A	ug/L		3.97	0.500
GW-WO2-1	06/22/90	M90-06.101	B	ug/L		85.9	15.9
GW-W2-2	11/09/90	M90-11.39	A	ug/L		18.3	2.49
GW-WO3-1	06/22/90	M90-06.101	B	ug/L		0.517	0.5
GW-W90-1	06/22/90	M90-06.101	B	ug/L	Field Duplicate of GW-W03-1	1.31	0.5
GW-W3-2	11/07/90	M90-11.39	A	ug/L		0.500	0.500
GW-W04-1	06/25/90	M90-06.117	BA	ug/L		53200	11800
GW-W4-2	11/11/90	M90-11.61	BA	ug/L		30.1	1.71
GW-W9Q-2	11/11/90	M90-11.61	BA	ug/L	Field Duplicate of GW-0W4-2	16.9	5.97
GW-WO5-1	06/22/90	M90-06.101	B	ug/L		23000	2330
GW-W5-2	11/11/90	M90-11.61	BA	ug/L		25.0	3.33
GW-W05-1	06/25/90	M90-07.14	B	ug/kg	Product	987000	1970000
GW-WO6-1	06/25/90	M90-06.101	B	ug/L		25.4	11
GW-W6-2	11/07/90	M90-11.39	A	ug/L		1380	240
GW-W08-1	06/25/90	M90-06.117	BA	ug/L		220000	5700
GW-W8-2	11/11/90	M90-11.61	BA	ug/L		146	33.1
GW-W08-1	06/28/90	M90-07.14	B	ug/kg	Product	29200000	7070000
GW-W8-2	11/11/90	M90-11.79	BA	ug/kg	Product	157000	19600
GW-W09-1	06/25/90	M90-06.117	BA	ug/L		0.856	0.5
GW-W9-2	11/12/90	M90-11.61	BA	ug/L		0.500	0.500
GW-W10-1	06/26/90	M89-06.125	B	ug/L		38.9	9.74
GW-W10-2	11/09/90	M90-11.39	A	ug/L		30.8	9.76
GW-W9P-2	11/09/90	M90-11.39	A	ug/L	Field Duplicate of GW-W10-2	46.3	2.68
GW-W11-1	06/25/90	M90-06.117	BA	ug/L		0.846	0.761
GW-W11-2	11/12/90	M90-11.61	BA	ug/L		431	45.2
GW-W13-1	06/25/90	M90-06.117	BA	ug/L		7420	1370
GW-W13-2	11/11/90	M90-11.61	BA	ug/L		44.1	11.9
GW-WO14-1	06/21/90	M90-06.101	B	ug/L		0.5	0.5
GW-W14-2	11/12/90	M90-11.61	BA	ug/L		0.500	0.500
GW-W15-1	06/25/90	M90-06.125	B	ug/L		7770	560
GW-W93-1	06/25/90	M90-06.125	B	ug/L	Field Duplicate of GW-W15-1	12000	834
GW-W15-2	11/11/90	M90-11.61	BA	ug/L		72.8	2.62
GW-WO16-1	06/21/90	M90-06.101	B	ug/L		0.5	0.5
GW-W16-2	11/12/90	M90-11.61	BA	ug/L		0.500	0.500
GW-MO1-1	06/21/90	M90-06.101	B	ug/L		2.14	0.5
GW-M1-2	11/07/90	M90-11.39	A	ug/L		9.07	1.16
GW-MO2-1	06/21/90	M90-06.101	B	ug/L		3.19	0.556
GW-M2-2	11/06/90	M90-11.39	A	ug/L		10.3	0.573
GW-W9M-2	11/06/90	M90-11.39	A	ug/L	Field Duplicate of GW-M2-2	3.32	0.500
GW-MO3-1	06/21/90	M90-06.101	B	ug/L		2.02	0.5
GW-M3-2	11/06/90	M90-11.39	A	ug/L		26.1	2.71
GW-MO4-1	06/20/90	M90-06.101	B	ug/L		3.22	0.5
GW-M4-2	11/06/90	M90-11.39	A	ug/L		2.46	0.654
GW-MO5-1	06/20/90	M90-06.101	B	ug/L		16.9	11.1
GW-M5-2	11/06/90	M90-11.39	A	ug/L		56.2	2.16
GW-MO6-1	06/21/90	M90-06.101	B	ug/L		6.28	2.76
GW-M6-2	11/06/90	M90-11.39	A	ug/L		174	62.1
GW-MO7-1	06/21/90	M90-06.101	B	ug/L		1.93	0.5
GW-M7-2	11/06/90	M90-11.39	A	ug/L		2.69	0.283
GW-MO8-1	06/21/90	M90-06.101	B	ug/L		5.83	1.67
GW-M8-2	11/06/90	M90-11.39	A	ug/L		26.2	5.53
GW-GW1-2	11/08/90	M90-11.39	A	ug/L		140	24.4
GW-GW2-2	11/08/90	M90-11.39	A	ug/L		30.6	6.82
GW-GW3-2	11/08/90	M90-11.39	A	ug/L		0.500	0.500
GW-GW4-2	11/12/90	M90-11.61	BA	ug/L		0.500	0.500
GW-GW5-2	11/12/90	M90-11.61	BA	ug/L		0.993	0.500
GW-GW6-2	11/07/90	M90-11.39	A	ug/L		0.500	0.500
GW-GW7-2	11/12/90	M90-11.61	BA	ug/L		0.500	0.500
GW-GW8-2	11/08/90	M90-11.39	A	ug/L		0.500	0.500
GW-GW9-2	11/09/90	M90-11.39	A	ug/L		0.500	0.500

POLYNUCLEAR AROMATIC HYDROCARBONS (PAHs)
IN GROUND WATER

GW-GW10-2	11/08/90	M90-11.39	A	ug/L		0.500	0.500
GW-GW11-2	11/09/90	M90-11.39	A	ug/L		2.55	0.906
GW-GW12-2	11/07/90	M90-11.39	A	ug/L		0.500	0.500
GW-GW13-2	11/08/90	M90-11.39	A	ug/L		0.500	0.500
GW-GW14-2	11/07/90	M90-11.39	A	ug/L		0.500	0.500
GW-GW15-2	11/08/90	M90-11.39	A	ug/L		0.500	0.500
GW-GW16-2	11/09/90	M90-11.39	A	ug/L		18.8	3.80
GW-GW17-2	11/08/90	M90-11.39	A	ug/L		0.500	0.500
GW-MT MORIAH	11/12/90	M90-11.61	BA	ug/L		0.500	0.500
GW-BONTEMPO	11/12/90	M90-11.61	BA	ug/L		0.500	0.500
GW15	12/07/90	M90-12.64		ug/L	12 HRS		
GW15	12/08/90	M90-12.64		ug/L	24 HRS		
GW15	12/08/90	M90-12.64		ug/L	36 HRS		
GW15	12/09/90	M90-12.64		ug/L	46 HRS		
GW-M30-1	06/22/90	M90-06.101	B	ug/L	Rinsate Blank	0.5	0.5
GW-M33-1	06//25/90	M90-06.117	BA	ug/L	Rinsate Blank	0.5	0.5
GW-R10-2	11/06/90	M90-11.39	A	ug/L	Rinsate Blank	0.500	0.500
GW-R11-2	11/08/90	M90-11.39	A	ug/L	Rinsate Blank	0.500	0.500
GW-R12-2	11/12/90	M90-11.61	BA	ug/L	Rinsate Blank	0.500	0.500
GW-GWP-2	11/07/90	M90-11.39	A	ug/L	PE	0.505	0.505
SW-100-1	07/12/90	M90-07.44	B	ug/L	Aqueous Bottle	0.5	0.5

POLYNUCLEAR AROMATIC HYDROCARBONS (PAHs)
IN GROUND WATER

LOCATION/WELL	DATE	WORK ORDER	A/B LEVEL	UNITS	COMMENTS	Fluoranthene	Pyrene
GW-W01-1	06/26/90	M90-06.125	B	ug/L		0.2	0.635
GW-W1-2	11/07/90	M90-11.39	A	ug/L		0.200	0.275
GW-WO2-1	06/22/90	M90-06.101	B	ug/L		7.68	12.7
GW-W2-2	11/09/90	M90-11.39	A	ug/L		2.00	2.37
GW-WO3-1	06/22/90	M90-06.101	B	ug/L		0.2	0.2
GW-W90-1	06/22/90	M90-06.101	B	ug/L	Field Duplicate of GW-W03-1	0.2	0.2
GW-W3-2	11/07/90	M90-11.39	A	ug/L		0.200	0.200
GW-W04-1	06/25/90	M90-06.117	BA	ug/L		2640	4300
GW-W4-2	11/11/90	M90-11.61	BA	ug/L		2.00	2.00
GW-W9Q-2	11/11/90	M90-11.61	BA	ug/L	Field Duplicate of GW-0W4-2	1.23	0.639
GW-WO5-1	06/22/90	M90-06.101	B	ug/L		526	4500
GW-W5-2	11/11/90	M90-11.61	BA	ug/L		2.39	1.36
GW-W05-1	06/25/90	M90-07.14	B	ug/kg	Product	1050000	3E+06
GW-WO6-1	06/25/90	M90-06.101	B	ug/L		0.2	18.3
GW-W6-2	11/07/90	M90-11.39	A	ug/L		270	474
GW-W08-1	06/25/90	M90-06.117	BA	ug/L		11400	18600
GW-W8-2	11/11/90	M90-11.61	BA	ug/L		31.1	13.9
GW-W08-1	06/28/90	M90-07.14	B	ug/kg	Product	6110000	2E+07
GW-W8-2	11/11/90	M90-11.79	BA	ug/kg	Product	70300	20000
GW-W09-1	06/25/90	M90-06.117	BA	ug/L		0.2	0.2
GW-W9-2	11/12/90	M90-11.61	BA	ug/L		0.200	0.200
GW-W10-1	06/26/90	M89-06.125	B	ug/L		18.8	29.1
GW-W10-2	11/09/90	M90-11.39	A	ug/L		3.35	3.16
GW-W9P-2	11/09/90	M90-11.39	A	ug/L	Field Duplicate of GW-W10-2	4.75	2.00
GW-W11-1	06/25/90	M90-06.117	BA	ug/L		3.9	7.58
GW-W11-2	11/12/90	M90-11.61	BA	ug/L		167	92.2
GW-W13-1	06/25/90	M90-06.117	BA	ug/L		185	698
GW-W13-2	11/11/90	M90-11.61	BA	ug/L		20.0	20.0
GW-WO14-1	06/21/90	M90-06.101	B	ug/L		0.2	0.2
GW-W14-2	11/12/90	M90-11.61	BA	ug/L		0.200	0.200
GW-W15-1	06/25/90	M90-06.125	B	ug/L		1360	80
GW-W93-1	06/25/90	M90-06.125	B	ug/L	Field Duplicate of GW-W15-1	2330	800
GW-W15-2	11/11/90	M90-11.61	BA	ug/L		6.26	3.31
GW-WO16-1	06/21/90	M90-06.101	B	ug/L		0.2	0.2
GW-W16-2	11/12/90	M90-11.61	BA	ug/L		0.200	0.200
GW-MO1-1	06/21/90	M90-06.101	B	ug/L		0.2	7.69
GW-M1-2	11/07/90	M90-11.39	A	ug/L		0.200	1.23
GW-MO2-1	06/21/90	M90-06.101	B	ug/L		0.2	0.582
GW-M2-2	11/06/90	M90-11.39	A	ug/L		0.200	0.382
GW-W9M-2	11/06/90	M90-11.39	A	ug/L	Field Duplicate of GW-M2-2	0.200	0.200
GW-MO3-1	06/21/90	M90-06.101	B	ug/L		0.2	0.2
GW-M3-2	11/06/90	M90-11.39	A	ug/L		0.200	2.52
GW-MO4-1	06/20/90	M90-06.101	B	ug/L		1.65	8.2
GW-M4-2	11/06/90	M90-11.39	A	ug/L		0.653	0.707
GW-MO5-1	06/20/90	M90-06.101	B	ug/L		16.8	52.3
GW-M5-2	11/06/90	M90-11.39	A	ug/L		1.80	26.2
GW-MO6-1	06/21/90	M90-06.101	B	ug/L		0.971	1.34
GW-M6-2	11/06/90	M90-11.39	A	ug/L		33.0	113
GW-MO7-1	06/21/90	M90-06.101	B	ug/L		0.2	0.317
GW-M7-2	11/06/90	M90-11.39	A	ug/L		0.200	0.465
GW-MO8-1	06/21/90	M90-06.101	B	ug/L		0.871	1.9
GW-M8-2	11/06/90	M90-11.39	A	ug/L		2.00	20.0
GW-GW1-2	11/08/90	M90-11.39	A	ug/L		10.4	20.0
GW-GW2-2	11/08/90	M90-11.39	A	ug/L		2.86	5.00
GW-GW3-2	11/08/90	M90-11.39	A	ug/L		0.200	0.200
GW-GW4-2	11/12/90	M90-11.61	BA	ug/L		0.200	0.200
GW-GW5-2	11/12/90	M90-11.61	BA	ug/L		0.200	0.221
GW-GW6-2	11/07/90	M90-11.39	A	ug/L		0.200	0.200
GW-GW7-2	11/12/90	M90-11.61	BA	ug/L		0.200	0.200
GW-GW8-2	11/08/90	M90-11.39	A	ug/L		0.200	0.200
GW-GW9-2	11/09/90	M90-11.39	A	ug/L		0.200	0.200

POLYNUCLEAR AROMATIC HYDROCARBONS (PAHs)
IN GROUND WATER

GW-GW10-2	11/08/90	M90-11.39	A	ug/L		0.200	0.200
GW-GW11-2	11/09/90	M90-11.39	A	ug/L		0.200	0.200
GW-GW12-2	11/07/90	M90-11.39	A	ug/L		0.200	0.200
GW-GW13-2	11/08/90	M90-11.39	A	ug/L		0.200	0.200
GW-GW14-2	11/07/90	M90-11.39	A	ug/L		0.236	0.448
GW-GW15-2	11/08/90	M90-11.39	A	ug/L		0.200	0.200
GW-GW16-2	11/09/90	M90-11.39	A	ug/L		0.937	4.17
GW-GW17-2	11/08/90	M90-11.39	A	ug/L		0.200	0.200
GW-MT MORIAH	11/12/90	M90-11.61	BA	ug/L		0.200	0.200
GW-BONTEMPO	11/12/90	M90-11.61	BA	ug/L		0.200	0.200
GW15	12/07/90	M90-12.64		ug/L	12 HRS		
GW15	12/08/90	M90-12.64		ug/L	24 HRS		
GW15	12/08/90	M90-12.64		ug/L	36 HRS		
GW15	12/09/90	M90-12.64		ug/L	46 HRS		
GW-M30-1	06/22/90	M90-06.101	B	ug/L	Rinsate Blank	0.2	0.2
GW-M33-1	06//25/90	M90-06.117	BA	ug/L	Rinsate Blank	0.2	0.2
GW-R10-2	11/06/90	M90-11.39	A	ug/L	Rinsate Blank	0.200	0.200
GW-R11-2	11/08/90	M90-11.39	A	ug/L	Rinsate Blank	0.200	0.200
GW-R12-2	11/12/90	M90-11.61	BA	ug/L	Rinsate Blank	0.200	0.200
GW-GWP-2	11/07/90	M90-11.39	A	ug/L	PE	0.202	37.7
SW-100-1	07/12/90	M90-07.44	B	ug/L	Aqueous Bottle	0.2	0.2

POLYNUCLEAR AROMATIC HYDROCARBONS (PAHs)
IN GROUND WATER

LOCATION/WELL	DATE	WORK ORDER	A/B LEVEL	UNITS	COMMENTS	Benzo(a)anthracene
GW-W01-1	06/26/90	M90-06.125	B	ug/L		0.02
GW-W1-2	11/07/90	M90-11.39	A	ug/L		0.030
GW-WO2-1	06/22/90	M90-06.101	B	ug/L		18.9
GW-W2-2	11/09/90	M90-11.39	A	ug/L		0.440
GW-WO3-1	06/22/90	M90-06.101	B	ug/L		0.02
GW-W90-1	06/22/90	M90-06.101	B	ug/L	Field Duplicate of GW-W03-1	0.02
GW-W3-2	11/07/90	M90-11.39	A	ug/L		0.020
GW-W04-1	06/25/90	M90-06.117	BA	ug/L		2030
GW-W4-2	11/11/90	M90-11.61	BA	ug/L		1.78
GW-W9Q-2	11/11/90	M90-11.61	BA	ug/L	Field Duplicate of GW-0W4-2	3.40
GW-WO5-1	06/22/90	M90-06.101	B	ug/L		2200
GW-W5-2	11/11/90	M90-11.61	BA	ug/L		1.19
GW-W05-1	06/25/90	M90-07.14	B	ug/kg	Product	418000
GW-WO6-1	06/25/90	M90-06.101	B	ug/L		7.83
GW-W6-2	11/07/90	M90-11.39	A	ug/L		283
GW-W08-1	06/25/90	M90-06.117	BA	ug/L		11500
GW-W8-2	11/11/90	M90-11.61	BA	ug/L		2.00
GW-W08-1	06/28/90	M90-07.14	B	ug/kg	Product	4420000
GW-W8-2	11/11/90	M90-11.79	BA	ug/kg	Product	45900
GW-W09-1	06/25/90	M90-06.117	BA	ug/L		0.02
GW-W9-2	11/12/90	M90-11.61	BA	ug/L		0.020
GW-W10-1	06/26/90	M89-06.125	B	ug/L		15.1
GW-W10-2	11/09/90	M90-11.39	A	ug/L		6.88
GW-W9P-2	11/09/90	M90-11.39	A	ug/L	Field Duplicate of GW-W10-2	6.15
GW-W11-1	06/25/90	M90-06.117	BA	ug/L		1.31
GW-W11-2	11/12/90	M90-11.61	BA	ug/L		78.9
GW-W13-1	06/25/90	M90-06.117	BA	ug/L		334
GW-W13-2	11/11/90	M90-11.61	BA	ug/L		0.959
GW-WO14-1	06/21/90	M90-06.101	B	ug/L		0.02
GW-W14-2	11/12/90	M90-11.61	BA	ug/L		0.020
GW-W15-1	06/25/90	M90-06.125	B	ug/L		783
GW-W93-1	06/25/90	M90-06.125	B	ug/L	Field Duplicate of GW-W15-1	1430
GW-W15-2	11/11/90	M90-11.61	BA	ug/L		8.59
GW-WO16-1	06/21/90	M90-06.101	B	ug/L		0.02
GW-W16-2	11/12/90	M90-11.61	BA	ug/L		0.020
GW-MO1-1	06/21/90	M90-06.101	B	ug/L		0.024
GW-M1-2	11/07/90	M90-11.39	A	ug/L		0.104
GW-MO2-1	06/21/90	M90-06.101	B	ug/L		0.02
GW-M2-2	11/06/90	M90-11.39	A	ug/L		0.079
GW-W9M-2	11/06/90	M90-11.39	A	ug/L	Field Duplicate of GW-M2-2	0.035
GW-MO3-1	06/21/90	M90-06.101	B	ug/L		0.02
GW-M3-2	11/06/90	M90-11.39	A	ug/L		0.091
GW-MO4-1	06/20/90	M90-06.101	B	ug/L		0.631
GW-M4-2	11/06/90	M90-11.39	A	ug/L		0.108
GW-MO5-1	06/20/90	M90-06.101	B	ug/L		36.4
GW-M5-2	11/06/90	M90-11.39	A	ug/L		6.13
GW-MO6-1	06/21/90	M90-06.101	B	ug/L		0.309
GW-M6-2	11/06/90	M90-11.39	A	ug/L		16.4
GW-MO7-1	06/21/90	M90-06.101	B	ug/L		0.16
GW-M7-2	11/06/90	M90-11.39	A	ug/L		0.106
GW-MO8-1	06/21/90	M90-06.101	B	ug/L		25.8
GW-M8-2	11/06/90	M90-11.39	A	ug/L		0.998
GW-GW1-2	11/08/90	M90-11.39	A	ug/L		22.5
GW-GW2-2	11/08/90	M90-11.39	A	ug/L		8.83
GW-GW3-2	11/08/90	M90-11.39	A	ug/L		0.020
GW-GW4-2	11/12/90	M90-11.61	BA	ug/L		0.020
GW-GW5-2	11/12/90	M90-11.61	BA	ug/L		0.020
GW-GW6-2	11/07/90	M90-11.39	A	ug/L		0.020
GW-GW7-2	11/12/90	M90-11.61	BA	ug/L		0.020
GW-GW8-2	11/08/90	M90-11.39	A	ug/L		0.106
GW-GW9-2	11/09/90	M90-11.39	A	ug/L		0.020

POLYNUCLEAR AROMATIC HYDROCARBONS (PAHs)
IN GROUND WATER

GW-GW10-2	11/08/90	M90-11.39	A	ug/L		0.020
GW-GW11-2	11/09/90	M90-11.39	A	ug/L		0.020
GW-GW12-2	11/07/90	M90-11.39	A	ug/L		0.039
GW-GW13-2	11/08/90	M90-11.39	A	ug/L		0.026
GW-GW14-2	11/07/90	M90-11.39	A	ug/L		0.068
GW-GW15-2	11/08/90	M90-11.39	A	ug/L		0.020
GW-GW16-2	11/09/90	M90-11.39	A	ug/L		6.66
GW-GW17-2	11/08/90	M90-11.39	A	ug/L		0.020
GW-MT MORIAH	11/12/90	M90-11.61	BA	ug/L		0.020
GW-BONTEMPO	11/12/90	M90-11.61	BA	ug/L		0.020
GW15	12/07/90	M90-12.64		ug/L	12 HRS	
GW15	12/08/90	M90-12.64		ug/L	24 HRS	
GW15	12/08/90	M90-12.64		ug/L	36 HRS	
GW15	12/09/90	M90-12.64		ug/L	46 HRS	
GW-M30-1	06/22/90	M90-06.101	B	ug/L	Rinsate Blank	0.02
GW-M33-1	06//25/90	M90-06.117	BA	ug/L	Rinsate Blank	0.02
GW-R10-2	11/06/90	M90-11.39	A	ug/L	Rinsate Blank	0.020
GW-R11-2	11/08/90	M90-11.39	A	ug/L	Rinsate Blank	0.020
GW-R12-2	11/12/90	M90-11.61	BA	ug/L	Rinsate Blank	0.020
GW-GWP-2	11/07/90	M90-11.39	A	ug/L	PE	10.0
SW-100-1	07/12/90	M90-07.44	B	ug/L	Aqueous Bottle	0.02

POLYNUCLEAR AROMATIC HYDROCARBONS (PAHs)
IN GROUND WATER

LOCATION/WELL	DATE	WORK ORDER	A/B LEVEL	UNITS	COMMENTS	Chrysene
GW-W01-1	06/26/90	M90-06.125	B	ug/L		0.15
GW-W1-2	11/07/90	M90-11.39	A	ug/L		0.150
GW-WO2-1	06/22/90	M90-06.101	B	ug/L		40.1
GW-W2-2	11/09/90	M90-11.39	A	ug/L		1.50
GW-WO3-1	06/22/90	M90-06.101	B	ug/L		0.15
GW-W90-1	06/22/90	M90-06.101	B	ug/L	Field Duplicate of GW-W03-1	0.15
GW-W3-2	11/07/90	M90-11.39	A	ug/L		0.150
GW-W04-1	06/25/90	M90-06.117	BA	ug/L		7430
GW-W4-2	11/11/90	M90-11.61	BA	ug/L		9.91
GW-W9Q-2	11/11/90	M90-11.61	BA	ug/L	Field Duplicate of GW-0W4-2	19.3
GW-WO5-1	06/22/90	M90-06.101	B	ug/L		752
GW-W5-2	11/11/90	M90-11.61	BA	ug/L		4.44
GW-W05-1	06/25/90	M90-07.14	B	ug/kg	Product	1160000
GW-WO6-1	06/25/90	M90-06.101	B	ug/L		45
GW-W6-2	11/07/90	M90-11.39	A	ug/L		635
GW-W08-1	06/25/90	M90-06.117	BA	ug/L		49500
GW-W8-2	11/11/90	M90-11.61	BA	ug/L		156
GW-W08-1	06/28/90	M90-07.14	B	ug/kg	Product	1E+07
GW-W8-2	11/11/90	M90-11.79	BA	ug/kg	Product	103000
GW-W09-1	06/25/90	M90-06.117	BA	ug/L		0.15
GW-W9-2	11/12/90	M90-11.61	BA	ug/L		0.150
GW-W10-1	06/26/90	M89-06.125	B	ug/L		61.3
GW-W10-2	11/09/90	M90-11.39	A	ug/L		5.78
GW-W9P-2	11/09/90	M90-11.39	A	ug/L	Field Duplicate of GW-W10-2	8.67
GW-W11-1	06/25/90	M90-06.117	BA	ug/L		3.96
GW-W11-2	11/12/90	M90-11.61	BA	ug/L		166
GW-W13-1	06/25/90	M90-06.117	BA	ug/L		1980
GW-W13-2	11/11/90	M90-11.61	BA	ug/L		53.8
GW-WO14-1	06/21/90	M90-06.101	B	ug/L		0.15
GW-W14-2	11/12/90	M90-11.61	BA	ug/L		0.150
GW-W15-1	06/25/90	M90-06.125	B	ug/L		3600
GW-W93-1	06/25/90	M90-06.125	B	ug/L	Field Duplicate of GW-W15-1	6760
GW-W15-2	11/11/90	M90-11.61	BA	ug/L		102
GW-WO16-1	06/21/90	M90-06.101	B	ug/L		0.15
GW-W16-2	11/12/90	M90-11.61	BA	ug/L		0.150
GW-MO1-1	06/21/90	M90-06.101	B	ug/L		1.44
GW-M1-2	11/07/90	M90-11.39	A	ug/L		0.191
GW-MO2-1	06/21/90	M90-06.101	B	ug/L		0.15
GW-M2-2	11/06/90	M90-11.39	A	ug/L		0.320
GW-W9M-2	11/06/90	M90-11.39	A	ug/L	Field Duplicate of GW-M2-2	0.150
GW-MO3-1	06/21/90	M90-06.101	B	ug/L		0.15
GW-M3-2	11/06/90	M90-11.39	A	ug/L		0.245
GW-MO4-1	06/20/90	M90-06.101	B	ug/L		2.26
GW-M4-2	11/06/90	M90-11.39	A	ug/L		1.32
GW-MO5-1	06/20/90	M90-06.101	B	ug/L		84.5
GW-M5-2	11/06/90	M90-11.39	A	ug/L		11.4
GW-MO6-1	06/21/90	M90-06.101	B	ug/L		1.05
GW-M6-2	11/06/90	M90-11.39	A	ug/L		141
GW-MO7-1	06/21/90	M90-06.101	B	ug/L		0.409
GW-M7-2	11/06/90	M90-11.39	A	ug/L		0.189
GW-MO8-1	06/21/90	M90-06.101	B	ug/L		7.34
GW-M8-2	11/06/90	M90-11.39	A	ug/L		2.73
GW-GW1-2	11/08/90	M90-11.39	A	ug/L		18.2
GW-GW2-2	11/08/90	M90-11.39	A	ug/L		10.4
GW-GW3-2	11/08/90	M90-11.39	A	ug/L		0.150
GW-GW4-2	11/12/90	M90-11.61	BA	ug/L		0.150
GW-GW5-2	11/12/90	M90-11.61	BA	ug/L		0.150
GW-GW6-2	11/07/90	M90-11.39	A	ug/L		0.150
GW-GW7-2	11/12/90	M90-11.61	BA	ug/L		0.150
GW-GW8-2	11/08/90	M90-11.39	A	ug/L		0.419
GW-GW9-2	11/09/90	M90-11.39	A	ug/L		0.150

POLYNUCLEAR AROMATIC HYDROCARBONS (PAHs)
IN GROUND WATER

GW-GW10-2	11/08/90	M90-11.39	A	ug/L		0.150
GW-GW11-2	11/09/90	M90-11.39	A	ug/L		0.150
GW-GW12-2	11/07/90	M90-11.39	A	ug/L		0.150
GW-GW13-2	11/08/90	M90-11.39	A	ug/L		0.150
GW-GW14-2	11/07/90	M90-11.39	A	ug/L		0.333
GW-GW15-2	11/08/90	M90-11.39	A	ug/L		0.150
GW-GW16-2	11/09/90	M90-11.39	A	ug/L		11.3
GW-GW17-2	11/08/90	M90-11.39	A	ug/L		0.150
GW-MT MORIAH	11/12/90	M90-11.61	BA	ug/L		0.150
GW-BONTEMPO	11/12/90	M90-11.61	BA	ug/L		0.150
GW15	12/07/90	M90-12.64		ug/L	12 HRS	
GW15	12/08/90	M90-12.64		ug/L	24 HRS	
GW15	12/08/90	M90-12.64		ug/L	36 HRS	
GW15	12/09/90	M90-12.64		ug/L	46 HRS	
GW-M30-1	06/22/90	M90-06.101	B	ug/L	Rinsate Blank	0.15
GW-M33-1	06//25/90	M90-06.117	BA	ug/L	Rinsate Blank	0.15
GW-R10-2	11/06/90	M90-11.39	A	ug/L	Rinsate Blank	0.150
GW-R11-2	11/08/90	M90-11.39	A	ug/L	Rinsate Blank	0.150
GW-R12-2	11/12/90	M90-11.61	BA	ug/L	Rinsate Blank	0.150
GW-GWP-2	11/07/90	M90-11.39	A	ug/L	PE	0.152
SW-100-1	07/12/90	M90-07.44	B	ug/L	Aqueous Bottle	0.15

POLYNUCLEAR AROMATIC HYDROCARBONS (PAHs)
IN GROUND WATER

LOCATION/WELL	DATE	WORK ORDER	A/B LEVEL	UNITS	COMMENTS	Benzo(b)fluoranthene
GW-W01-1	06/26/90	M90-06.125	B	ug/L		0.02
GW-W1-2	11/07/90	M90-11.39	A	ug/L		0.020
GW-WO2-1	06/22/90	M90-06.101	B	ug/L		0.553
GW-W2-2	11/09/90	M90-11.39	A	ug/L		0.200
GW-WO3-1	06/22/90	M90-06.101	B	ug/L		0.02
GW-W90-1	06/22/90	M90-06.101	B	ug/L	Field Duplicate of GW-W03-1	0.02
GW-W3-2	11/07/90	M90-11.39	A	ug/L		0.020
GW-W04-1	06/25/90	M90-06.117	BA	ug/L		408
GW-W4-2	11/11/90	M90-11.61	BA	ug/L		0.488
GW-W9Q-2	11/11/90	M90-11.61	BA	ug/L	Field Duplicate of GW-0W4-2	0.557
GW-WO5-1	06/22/90	M90-06.101	B	ug/L		149
GW-W5-2	11/11/90	M90-11.61	BA	ug/L		0.076
GW-W05-1	06/25/90	M90-07.14	B	ug/kg	Product	43800
GW-WO6-1	06/25/90	M90-06.101	B	ug/L		0.93
GW-W6-2	11/07/90	M90-11.39	A	ug/L		20.0
GW-W08-1	06/25/90	M90-06.117	BA	ug/L		1500
GW-W8-2	11/11/90	M90-11.61	BA	ug/L		0.119
GW-W08-1	06/28/90	M90-07.14	B	ug/kg	Product	278000
GW-W8-2	11/11/90	M90-11.79	BA	ug/kg	Product	5490
GW-W09-1	06/25/90	M90-06.117	BA	ug/L		0.02
GW-W9-2	11/12/90	M90-11.61	BA	ug/L		0.020
GW-W10-1	06/26/90	M89-06.125	B	ug/L		2.27
GW-W10-2	11/09/90	M90-11.39	A	ug/L		2.00
GW-W9P-2	11/09/90	M90-11.39	A	ug/L	Field Duplicate of GW-W10-2	0.364
GW-W11-1	06/25/90	M90-06.117	BA	ug/L		1.17
GW-W11-2	11/12/90	M90-11.61	BA	ug/L		15.7
GW-W13-1	06/25/90	M90-06.117	BA	ug/L		54.2
GW-W13-2	11/11/90	M90-11.61	BA	ug/L		2.26
GW-WO14-1	06/21/90	M90-06.101	B	ug/L		0.02
GW-W14-2	11/12/90	M90-11.61	BA	ug/L		0.020
GW-W15-1	06/25/90	M90-06.125	B	ug/L		113
GW-W93-1	06/25/90	M90-06.125	B	ug/L	Field Duplicate of GW-W15-1	174
GW-W15-2	11/11/90	M90-11.61	BA	ug/L		0.766
GW-WO16-1	06/21/90	M90-06.101	B	ug/L		0.02
GW-W16-2	11/12/90	M90-11.61	BA	ug/L		0.020
GW-MO1-1	06/21/90	M90-06.101	B	ug/L		0.157
GW-M1-2	11/07/90	M90-11.39	A	ug/L		0.020
GW-MO2-1	06/21/90	M90-06.101	B	ug/L		0.02
GW-M2-2	11/06/90	M90-11.39	A	ug/L		0.020
GW-W9M-2	11/06/90	M90-11.39	A	ug/L	Field Duplicate of GW-M2-2	0.020
GW-MO3-1	06/21/90	M90-06.101	B	ug/L		0.02
GW-M3-2	11/06/90	M90-11.39	A	ug/L		0.020
GW-MO4-1	06/20/90	M90-06.101	B	ug/L		0.02
GW-M4-2	11/06/90	M90-11.39	A	ug/L		0.020
GW-MO5-1	06/20/90	M90-06.101	B	ug/L		1.04
GW-M5-2	11/06/90	M90-11.39	A	ug/L		0.319
GW-MO6-1	06/21/90	M90-06.101	B	ug/L		0.093
GW-M6-2	11/06/90	M90-11.39	A	ug/L		0.200
GW-MO7-1	06/21/90	M90-06.101	B	ug/L		0.02
GW-M7-2	11/06/90	M90-11.39	A	ug/L		0.020
GW-MO8-1	06/21/90	M90-06.101	B	ug/L		10.5
GW-M8-2	11/06/90	M90-11.39	A	ug/L		0.115
GW-GW1-2	11/08/90	M90-11.39	A	ug/L		2.00
GW-GW2-2	11/08/90	M90-11.39	A	ug/L		0.200
GW-GW3-2	11/08/90	M90-11.39	A	ug/L		0.020
GW-GW4-2	11/12/90	M90-11.61	BA	ug/L		0.020
GW-GW5-2	11/12/90	M90-11.61	BA	ug/L		0.020
GW-GW6-2	11/07/90	M90-11.39	A	ug/L		0.022
GW-GW7-2	11/12/90	M90-11.61	BA	ug/L		0.020
GW-GW8-2	11/08/90	M90-11.39	A	ug/L		0.020
GW-GW9-2	11/09/90	M90-11.39	A	ug/L		0.020

POLYNUCLEAR AROMATIC HYDROCARBONS (PAHs)
IN GROUND WATER

GW-GW10-2	11/08/90	M90-11.39	A	ug/L		0.020
GW-GW11-2	11/09/90	M90-11.39	A	ug/L		0.020
GW-GW12-2	11/07/90	M90-11.39	A	ug/L		0.020
GW-GW13-2	11/08/90	M90-11.39	A	ug/L		0.032
GW-GW14-2	11/07/90	M90-11.39	A	ug/L		0.074
GW-GW15-2	11/08/90	M90-11.39	A	ug/L		0.020
GW-GW16-2	11/09/90	M90-11.39	A	ug/L		0.200
GW-GW17-2	11/08/90	M90-11.39	A	ug/L		0.020
GW-MT MORIAH	11/12/90	M90-11.61	BA	ug/L		0.020
GW-BONTEMPO	11/12/90	M90-11.61	BA	ug/L		0.020
GW15	12/07/90	M90-12.64		ug/L	12 HRS	
GW15	12/08/90	M90-12.64		ug/L	24 HRS	
GW15	12/08/90	M90-12.64		ug/L	36 HRS	
GW15	12/09/90	M90-12.64		ug/L	46 HRS	
GW-M30-1	06/22/90	M90-06.101	B	ug/L	Rinsate Blank	0.02
GW-M33-1	06//25/90	M90-06.117	BA	ug/L	Rinsate Blank	0.02
GW-R10-2	11/06/90	M90-11.39	A	ug/L	Rinsate Blank	0.020
GW-R11-2	11/08/90	M90-11.39	A	ug/L	Rinsate Blank	0.020
GW-R12-2	11/12/90	M90-11.61	BA	ug/L	Rinsate Blank	0.020
GW-GWP-2	11/07/90	M90-11.39	A	ug/L	PE	0.020
SW-100-1	07/12/90	M90-07.44	B	ug/L	Aqueous Bottle	0.02

POLYNUCLEAR AROMATIC HYDROCARBONS (PAHs)
IN GROUND WATER

LOCATION/WELL	DATE	WORK ORDER	A/B LEVEL	UNITS	COMMENTS	Benzo(k)fluoranthene
GW-W01-1	06/26/90	M90-06.125	B	ug/L		0.02
GW-W1-2	11/07/90	M90-11.39	A	ug/L		0.020
GW-WO2-1	06/22/90	M90-06.101	B	ug/L		0.342
GW-W2-2	11/09/90	M90-11.39	A	ug/L		0.200
GW-WO3-1	06/22/90	M90-06.101	B	ug/L		0.02
GW-W90-1	06/22/90	M90-06.101	B	ug/L	Field Duplicate of GW-W03-1	0.02
GW-W3-2	11/07/90	M90-11.39	A	ug/L		0.020
GW-W04-1	06/25/90	M90-06.117	BA	ug/L		205
GW-W4-2	11/11/90	M90-11.61	BA	ug/L		0.139
GW-W9Q-2	11/11/90	M90-11.61	BA	ug/L	Field Duplicate of GW-0W4-2	0.096
GW-WO5-1	06/22/90	M90-06.101	B	ug/L		158
GW-W5-2	11/11/90	M90-11.61	BA	ug/L		0.031
GW-W05-1	06/25/90	M90-07.14	B	ug/kg	Product	21900
GW-WO6-1	06/25/90	M90-06.101	B	ug/L		0.707
GW-W6-2	11/07/90	M90-11.39	A	ug/L		20.0
GW-W08-1	06/25/90	M90-06.117	BA	ug/L		811
GW-W8-2	11/11/90	M90-11.61	BA	ug/L		0.293
GW-W08-1	06/28/90	M90-07.14	B	ug/kg	Product	115000
GW-W8-2	11/11/90	M90-11.79	BA	ug/kg	Product	1380
GW-W09-1	06/25/90	M90-06.117	BA	ug/L		0.02
GW-W9-2	11/12/90	M90-11.61	BA	ug/L		0.020
GW-W10-1	06/26/90	M89-06.125	B	ug/L		1.67
GW-W10-2	11/09/90	M90-11.39	A	ug/L		2.00
GW-W9P-2	11/09/90	M90-11.39	A	ug/L	Field Duplicate of GW-W10-2	0.097
GW-W11-1	06/25/90	M90-06.117	BA	ug/L		0.442
GW-W11-2	11/12/90	M90-11.61	BA	ug/L		5.11
GW-W13-1	06/25/90	M90-06.117	BA	ug/L		27.4
GW-W13-2	11/11/90	M90-11.61	BA	ug/L		2.00
GW-WO14-1	06/21/90	M90-06.101	B	ug/L		0.02
GW-W14-2	11/12/90	M90-11.61	BA	ug/L		0.020
GW-W15-1	06/25/90	M90-06.125	B	ug/L		78.6
GW-W93-1	06/25/90	M90-06.125	B	ug/L	Field Duplicate of GW-W15-1	123
GW-W15-2	11/11/90	M90-11.61	BA	ug/L		0.171
GW-WO16-1	06/21/90	M90-06.101	B	ug/L		0.02
GW-W16-2	11/12/90	M90-11.61	BA	ug/L		0.020
GW-MO1-1	06/21/90	M90-06.101	B	ug/L		0.02
GW-M1-2	11/07/90	M90-11.39	A	ug/L		0.020
GW-MO2-1	06/21/90	M90-06.101	B	ug/L		0.02
GW-M2-2	11/06/90	M90-11.39	A	ug/L		0.020
GW-W9M-2	11/06/90	M90-11.39	A	ug/L	Field Duplicate of GW-M2-2	0.020
GW-MO3-1	06/21/90	M90-06.101	B	ug/L		0.02
GW-M3-2	11/06/90	M90-11.39	A	ug/L		0.020
GW-MO4-1	06/20/90	M90-06.101	B	ug/L		0.02
GW-M4-2	11/06/90	M90-11.39	A	ug/L		0.020
GW-MO5-1	06/20/90	M90-06.101	B	ug/L		0.323
GW-M5-2	11/06/90	M90-11.39	A	ug/L		0.199
GW-MO6-1	06/21/90	M90-06.101	B	ug/L		0.02
GW-M6-2	11/06/90	M90-11.39	A	ug/L		0.200
GW-MO7-1	06/21/90	M90-06.101	B	ug/L		0.02
GW-M7-2	11/06/90	M90-11.39	A	ug/L		0.020
GW-MO8-1	06/21/90	M90-06.101	B	ug/L		14
GW-M8-2	11/06/90	M90-11.39	A	ug/L		0.020
GW-GW1-2	11/08/90	M90-11.39	A	ug/L		2.00
GW-GW2-2	11/08/90	M90-11.39	A	ug/L		0.200
GW-GW3-2	11/08/90	M90-11.39	A	ug/L		0.020
GW-GW4-2	11/12/90	M90-11.61	BA	ug/L		0.020
GW-GW5-2	11/12/90	M90-11.61	BA	ug/L		0.020
GW-GW6-2	11/07/90	M90-11.39	A	ug/L		0.020
GW-GW7-2	11/12/90	M90-11.61	BA	ug/L		0.020
GW-GW8-2	11/08/90	M90-11.39	A	ug/L		0.020
GW-GW9-2	11/09/90	M90-11.39	A	ug/L		0.020

POLYNUCLEAR AROMATIC HYDROCARBONS (PAHs)
IN GROUND WATER

GW-GW10-2	11/08/90	M90-11.39	A	ug/L		0.020
GW-GW11-2	11/09/90	M90-11.39	A	ug/L		0.020
GW-GW12-2	11/07/90	M90-11.39	A	ug/L		0.020
GW-GW13-2	11/08/90	M90-11.39	A	ug/L		0.020
GW-GW14-2	11/07/90	M90-11.39	A	ug/L		0.020
GW-GW15-2	11/08/90	M90-11.39	A	ug/L		0.020
GW-GW16-2	11/09/90	M90-11.39	A	ug/L		0.200
GW-GW17-2	11/08/90	M90-11.39	A	ug/L		0.020
GW-MT MORIAH	11/12/90	M90-11.61	BA	ug/L		0.020
GW-BONTEMPO	11/12/90	M90-11.61	BA	ug/L		0.020
GW15	12/07/90	M90-12.64		ug/L	12 HRS	
GW15	12/08/90	M90-12.64		ug/L	24 HRS	
GW15	12/08/90	M90-12.64		ug/L	36 HRS	
GW15	12/09/90	M90-12.64		ug/L	46 HRS	
GW-M30-1	06/22/90	M90-06.101	B	ug/L	Rinsate Blank	0.02
GW-M33-1	06//25/90	M90-06.117	BA	ug/L	Rinsate Blank	0.02
GW-R10-2	11/06/90	M90-11.39	A	ug/L	Rinsate Blank	0.020
GW-R11-2	11/08/90	M90-11.39	A	ug/L	Rinsate Blank	0.020
GW-R12-2	11/12/90	M90-11.61	BA	ug/L	Rinsate Blank	0.020
GW-GWP-2	11/07/90	M90-11.39	A	ug/L	PE	1.32
SW-100-1	07/12/90	M90-07.44	B	ug/L	Aqueous Bottle	0.02

POLYNUCLEAR AROMATIC HYDROCARBONS (PAHs)
IN GROUND WATER

LOCATION/WELL	DATE	WORK ORDER	A/B LEVEL	UNITS	COMMENTS	Benzo(a)pyrene
GW-W01-1	06/26/90	M90-06.125	B	ug/L		0.02
GW-W1-2	11/07/90	M90-11.39	A	ug/L		0.020
GW-WO2-1	06/22/90	M90-06.101	B	ug/L		0.28
GW-W2-2	11/09/90	M90-11.39	A	ug/L		0.200
GW-WO3-1	06/22/90	M90-06.101	B	ug/L		0.02
GW-W90-1	06/22/90	M90-06.101	B	ug/L	Field Duplicate of GW-W03-1	0.02
GW-W3-2	11/07/90	M90-11.39	A	ug/L		0.020
GW-W04-1	06/25/90	M90-06.117	BA	ug/L		722
GW-W4-2	11/11/90	M90-11.61	BA	ug/L		0.333
GW-W9Q-2	11/11/90	M90-11.61	BA	ug/L	Field Duplicate of GW-0W4-2	0.223
GW-WO5-1	06/22/90	M90-06.101	B	ug/L		311
GW-W5-2	11/11/90	M90-11.61	BA	ug/L		0.067
GW-W05-1	06/25/90	M90-07.14	B	ug/kg	Product	44000
GW-WO6-1	06/25/90	M90-06.101	B	ug/L		0.908
GW-W6-2	11/07/90	M90-11.39	A	ug/L		20.0
GW-W08-1	06/25/90	M90-06.117	BA	ug/L		1480
GW-W8-2	11/11/90	M90-11.61	BA	ug/L		0.352
GW-W08-1	06/28/90	M90-07.14	B	ug/kg	Product	448000
GW-W8-2	11/11/90	M90-11.79	BA	ug/kg	Product	1750
GW-W09-1	06/25/90	M90-06.117	BA	ug/L		0.02
GW-W9-2	11/12/90	M90-11.61	BA	ug/L		0.020
GW-W10-1	06/26/90	M89-06.125	B	ug/L		1.99
GW-W10-2	11/09/90	M90-11.39	A	ug/L		2.00
GW-W9P-2	11/09/90	M90-11.39	A	ug/L	Field Duplicate of GW-W10-2	0.355
GW-W11-1	06/25/90	M90-06.117	BA	ug/L		1.3
GW-W11-2	11/12/90	M90-11.61	BA	ug/L		7.20
GW-W13-1	06/25/90	M90-06.117	BA	ug/L		60.2
GW-W13-2	11/11/90	M90-11.61	BA	ug/L		0.616
GW-WO14-1	06/21/90	M90-06.101	B	ug/L		0.02
GW-W14-2	11/12/90	M90-11.61	BA	ug/L		0.020
GW-W15-1	06/25/90	M90-06.125	B	ug/L		128
GW-W93-1	06/25/90	M90-06.125	B	ug/L	Field Duplicate of GW-W15-1	152
GW-W15-2	11/11/90	M90-11.61	BA	ug/L		0.440
GW-WO16-1	06/21/90	M90-06.101	B	ug/L		0.02
GW-W16-2	11/12/90	M90-11.61	BA	ug/L		0.020
GW-MO1-1	06/21/90	M90-06.101	B	ug/L		0.054
GW-M1-2	11/07/90	M90-11.39	A	ug/L		0.020
GW-MO2-1	06/21/90	M90-06.101	B	ug/L		0.02
GW-M2-2	11/06/90	M90-11.39	A	ug/L		0.020
GW-W9M-2	11/06/90	M90-11.39	A	ug/L	Field Duplicate of GW-M2-2	0.020
GW-MO3-1	06/21/90	M90-06.101	B	ug/L		0.02
GW-M3-2	11/06/90	M90-11.39	A	ug/L		0.020
GW-MO4-1	06/20/90	M90-06.101	B	ug/L		0.024
GW-M4-2	11/06/90	M90-11.39	A	ug/L		0.020
GW-MO5-1	06/20/90	M90-06.101	B	ug/L		0.18
GW-M5-2	11/06/90	M90-11.39	A	ug/L		0.133
GW-MO6-1	06/21/90	M90-06.101	B	ug/L		0.043
GW-M6-2	11/06/90	M90-11.39	A	ug/L		0.830
GW-MO7-1	06/21/90	M90-06.101	B	ug/L		0.02
GW-M7-2	11/06/90	M90-11.39	A	ug/L		0.020
GW-MO8-1	06/21/90	M90-06.101	B	ug/L		4.91
GW-M8-2	11/06/90	M90-11.39	A	ug/L		0.075
GW-GW1-2	11/08/90	M90-11.39	A	ug/L		2.00
GW-GW2-2	11/08/90	M90-11.39	A	ug/L		0.200
GW-GW3-2	11/08/90	M90-11.39	A	ug/L		0.020
GW-GW4-2	11/12/90	M90-11.61	BA	ug/L		0.020
GW-GW5-2	11/12/90	M90-11.61	BA	ug/L		0.020
GW-GW6-2	11/07/90	M90-11.39	A	ug/L		0.020
GW-GW7-2	11/12/90	M90-11.61	BA	ug/L		0.020
GW-GW8-2	11/08/90	M90-11.39	A	ug/L		0.020
GW-GW9-2	11/09/90	M90-11.39	A	ug/L		0.020

POLYNUCLEAR AROMATIC HYDROCARBONS (PAHs)
IN GROUND WATER

GW-GW10-2	11/08/90	M90-11.39	A	ug/L		0.020
GW-GW11-2	11/09/90	M90-11.39	A	ug/L		0.020
GW-GW12-2	11/07/90	M90-11.39	A	ug/L		0.020
GW-GW13-2	11/08/90	M90-11.39	A	ug/L		0.020
GW-GW14-2	11/07/90	M90-11.39	A	ug/L		0.024
GW-GW15-2	11/08/90	M90-11.39	A	ug/L		0.020
GW-GW16-2	11/09/90	M90-11.39	A	ug/L		0.200
GW-GW17-2	11/08/90	M90-11.39	A	ug/L		0.020
GW-MT MORIAH	11/12/90	M90-11.61	BA	ug/L		0.020
GW-BONTEMPO	11/12/90	M90-11.61	BA	ug/L		0.020
GW15	12/07/90	M90-12.64		ug/L	12 HRS	
GW15	12/08/90	M90-12.64		ug/L	24 HRS	
GW15	12/08/90	M90-12.64		ug/L	36 HRS	
GW15	12/09/90	M90-12.64		ug/L	46 HRS	
GW-M30-1	06/22/90	M90-06.101	B	ug/L	Rinsate Blank	0.02
GW-M33-1	06//25/90	M90-06.117	BA	ug/L	Rinsate Blank	0.02
GW-R10-2	11/06/90	M90-11.39	A	ug/L	Rinsate Blank	0.020
GW-R11-2	11/08/90	M90-11.39	A	ug/L	Rinsate Blank	0.020
GW-R12-2	11/12/90	M90-11.61	BA	ug/L	Rinsate Blank	0.020
GW-GWP-2	11/07/90	M90-11.39	A	ug/L	PE	0.020
SW-100-1	07/12/90	M90-07.44	B	ug/L	Aqueous Bottle	0.02

POLYNUCLEAR AROMATIC HYDROCARBONS (PAHs)
IN GROUND WATER

LOCATION/WELL	DATE	WORK ORDER	A/B LEVEL	UNITS	COMMENTS	Dibenzo(a,h)anthracene
GW-W01-1	06/26/90	M90-06.125	B	ug/L		0.03
GW-W1-2	11/07/90	M90-11.39	A	ug/L		0.030
GW-WO2-1	06/22/90	M90-06.101	B	ug/L		0.3
GW-W2-2	11/09/90	M90-11.39	A	ug/L		0.030
GW-WO3-1	06/22/90	M90-06.101	B	ug/L		0.03
GW-W90-1	06/22/90	M90-06.101	B	ug/L	Field Duplicate of GW-W03-1	0.03
GW-W3-2	11/07/90	M90-11.39	A	ug/L		0.030
GW-W04-1	06/25/90	M90-06.117	BA	ug/L		1280
GW-W4-2	11/11/90	M90-11.61	BA	ug/L		0.058
GW-W9Q-2	11/11/90	M90-11.61	BA	ug/L	Field Duplicate of GW-0W4-2	0.300
GW-WO5-1	06/22/90	M90-06.101	B	ug/L		300
GW-W5-2	11/11/90	M90-11.61	BA	ug/L		0.076
GW-W05-1	06/25/90	M90-07.14	B	ug/kg	Product	15000
GW-WO6-1	06/25/90	M90-06.101	B	ug/L		0.3
GW-W6-2	11/07/90	M90-11.39	A	ug/L		30.0
GW-W08-1	06/25/90	M90-06.117	BA	ug/L		1200
GW-W8-2	11/11/90	M90-11.61	BA	ug/L		1.51
GW-W08-1	06/28/90	M90-07.14	B	ug/kg	Product	3000
GW-W8-2	11/11/90	M90-11.79	BA	ug/kg	Product	2510
GW-W09-1	06/25/90	M90-06.117	BA	ug/L		0.03
GW-W9-2	11/12/90	M90-11.61	BA	ug/L		0.030
GW-W10-1	06/26/90	M89-06.125	B	ug/L		3
GW-W10-2	11/09/90	M90-11.39	A	ug/L		3.00
GW-W9P-2	11/09/90	M90-11.39	A	ug/L	Field Duplicate of GW-W10-2	0.030
GW-W11-1	06/25/90	M90-06.117	BA	ug/L		3.49
GW-W11-2	11/12/90	M90-11.61	BA	ug/L		3.89
GW-W13-1	06/25/90	M90-06.117	BA	ug/L		30
GW-W13-2	11/11/90	M90-11.61	BA	ug/L		3.00
GW-WO14-1	06/21/90	M90-06.101	B	ug/L		0.03
GW-W14-2	11/12/90	M90-11.61	BA	ug/L		0.030
GW-W15-1	06/25/90	M90-06.125	B	ug/L		120
GW-W93-1	06/25/90	M90-06.125	B	ug/L	Field Duplicate of GW-W15-1	120
GW-W15-2	11/11/90	M90-11.61	BA	ug/L		4.24
GW-WO16-1	06/21/90	M90-06.101	B	ug/L		0.03
GW-W16-2	11/12/90	M90-11.61	BA	ug/L		0.030
GW-MO1-1	06/21/90	M90-06.101	B	ug/L		0.03
GW-M1-2	11/07/90	M90-11.39	A	ug/L		0.030
GW-MO2-1	06/21/90	M90-06.101	B	ug/L		0.03
GW-M2-2	11/06/90	M90-11.39	A	ug/L		0.030
GW-W9M-2	11/06/90	M90-11.39	A	ug/L	Field Duplicate of GW-M2-2	0.048
GW-MO3-1	06/21/90	M90-06.101	B	ug/L		0.03
GW-M3-2	11/06/90	M90-11.39	A	ug/L		0.030
GW-MO4-1	06/20/90	M90-06.101	B	ug/L		0.03
GW-M4-2	11/06/90	M90-11.39	A	ug/L		0.030
GW-MO5-1	06/20/90	M90-06.101	B	ug/L		3
GW-M5-2	11/06/90	M90-11.39	A	ug/L		0.300
GW-MO6-1	06/21/90	M90-06.101	B	ug/L		0.03
GW-M6-2	11/06/90	M90-11.39	A	ug/L		3.00
GW-MO7-1	06/21/90	M90-06.101	B	ug/L		0.03
GW-M7-2	11/06/90	M90-11.39	A	ug/L		0.030
GW-MO8-1	06/21/90	M90-06.101	B	ug/L		0.03
GW-M8-2	11/06/90	M90-11.39	A	ug/L		0.545
GW-GW1-2	11/08/90	M90-11.39	A	ug/L		0.300
GW-GW2-2	11/08/90	M90-11.39	A	ug/L		0.300
GW-GW3-2	11/08/90	M90-11.39	A	ug/L		0.030
GW-GW4-2	11/12/90	M90-11.61	BA	ug/L		0.030
GW-GW5-2	11/12/90	M90-11.61	BA	ug/L		0.030
GW-GW6-2	11/07/90	M90-11.39	A	ug/L		0.030
GW-GW7-2	11/12/90	M90-11.61	BA	ug/L		0.030
GW-GW8-2	11/08/90	M90-11.39	A	ug/L		0.030
GW-GW9-2	11/09/90	M90-11.39	A	ug/L		0.030

POLYNUCLEAR AROMATIC HYDROCARBONS (PAHs)
IN GROUND WATER

GW-GW10-2	11/08/90	M90-11.39	A	ug/L		0.030
GW-GW11-2	11/09/90	M90-11.39	A	ug/L		0.030
GW-GW12-2	11/07/90	M90-11.39	A	ug/L		0.030
GW-GW13-2	11/08/90	M90-11.39	A	ug/L		0.030
GW-GW14-2	11/07/90	M90-11.39	A	ug/L		0.298
GW-GW15-2	11/08/90	M90-11.39	A	ug/L		0.030
GW-GW16-2	11/09/90	M90-11.39	A	ug/L		0.030
GW-GW17-2	11/08/90	M90-11.39	A	ug/L		0.030
GW-MT MORIAH	11/12/90	M90-11.61	BA	ug/L		0.030
GW-BONTEMPO	11/12/90	M90-11.61	BA	ug/L		0.030
GW15	12/07/90	M90-12.64		ug/L	12 HRS	
GW15	12/08/90	M90-12.64		ug/L	24 HRS	
GW15	12/08/90	M90-12.64		ug/L	36 HRS	
GW15	12/09/90	M90-12.64		ug/L	46 HRS	
GW-M30-1	06/22/90	M90-06.101	B	ug/L	Rinsate Blank	0.03
GW-M33-1	06//25/90	M90-06.117	BA	ug/L	Rinsate Blank	0.03
GW-R10-2	11/06/90	M90-11.39	A	ug/L	Rinsate Blank	0.030
GW-R11-2	11/08/90	M90-11.39	A	ug/L	Rinsate Blank	0.030
GW-R12-2	11/12/90	M90-11.61	BA	ug/L	Rinsate Blank	0.030
GW-GWP-2	11/07/90	M90-11.39	A	ug/L	PE	0.030
SW-100-1	07/12/90	M90-07.44	B	ug/L	Aqueous Bottle	0.03

POLYNUCLEAR AROMATIC HYDROCARBONS (PAHs)
IN GROUND WATER

LOCATION/WELL	DATE	WORK ORDER	A/B LEVEL	UNITS	COMMENTS	Benzo(g,h,i)perylene
GW-W01-1	06/26/90	M90-06.125	B	ug/L		0.05
GW-W1-2	11/07/90	M90-11.39	A	ug/L		0.050
GW-WO2-1	06/22/90	M90-06.101	B	ug/L		0.5
GW-W2-2	11/09/90	M90-11.39	A	ug/L		0.050
GW-WO3-1	06/22/90	M90-06.101	B	ug/L		0.05
GW-W90-1	06/22/90	M90-06.101	B	ug/L	Field Duplicate of GW-W03-1	0.05
GW-W3-2	11/07/90	M90-11.39	A	ug/L		0.050
GW-W04-1	06/25/90	M90-06.117	BA	ug/L		621
GW-W4-2	11/11/90	M90-11.61	BA	ug/L		0.050
GW-W9Q-2	11/11/90	M90-11.61	BA	ug/L	Field Duplicate of GW-0W4-2	0.500
GW-WO5-1	06/22/90	M90-06.101	B	ug/L		500
GW-W5-2	11/11/90	M90-11.61	BA	ug/L		0.050
GW-W05-1	06/25/90	M90-07.14	B	ug/kg	Product	25000
GW-WO6-1	06/25/90	M90-06.101	B	ug/L		0.5
GW-W6-2	11/07/90	M90-11.39	A	ug/L		50.0
GW-W08-1	06/25/90	M90-06.117	BA	ug/L		2000
GW-W8-2	11/11/90	M90-11.61	BA	ug/L		0.500
GW-W08-1	06/28/90	M90-07.14	B	ug/kg	Product	5000
GW-W8-2	11/11/90	M90-11.79	BA	ug/kg	Product	189
GW-W09-1	06/25/90	M90-06.117	BA	ug/L		0.05
GW-W9-2	11/12/90	M90-11.61	BA	ug/L		0.050
GW-W10-1	06/26/90	M89-06.125	B	ug/L		5
GW-W10-2	11/09/90	M90-11.39	A	ug/L		5.00
GW-W9P-2	11/09/90	M90-11.39	A	ug/L	Field Duplicate of GW-W10-2	0.050
GW-W11-1	06/25/90	M90-06.117	BA	ug/L		1.86
GW-W11-2	11/12/90	M90-11.61	BA	ug/L		5.00
GW-W13-1	06/25/90	M90-06.117	BA	ug/L		50
GW-W13-2	11/11/90	M90-11.61	BA	ug/L		5.00
GW-WO14-1	06/21/90	M90-06.101	B	ug/L		0.05
GW-W14-2	11/12/90	M90-11.61	BA	ug/L		0.050
GW-W15-1	06/25/90	M90-06.125	B	ug/L		200
GW-W93-1	06/25/90	M90-06.125	B	ug/L	Field Duplicate of GW-W15-1	200
GW-W15-2	11/11/90	M90-11.61	BA	ug/L		0.096
GW-WO16-1	06/21/90	M90-06.101	B	ug/L		0.05
GW-W16-2	11/12/90	M90-11.61	BA	ug/L		0.050
GW-MO1-1	06/21/90	M90-06.101	B	ug/L		0.05
GW-M1-2	11/07/90	M90-11.39	A	ug/L		0.050
GW-MO2-1	06/21/90	M90-06.101	B	ug/L		0.05
GW-M2-2	11/06/90	M90-11.39	A	ug/L		0.050
GW-W9M-2	11/06/90	M90-11.39	A	ug/L	Field Duplicate of GW-M2-2	0.050
GW-MO3-1	06/21/90	M90-06.101	B	ug/L		0.05
GW-M3-2	11/06/90	M90-11.39	A	ug/L		0.050
GW-MO4-1	06/20/90	M90-06.101	B	ug/L		0.05
GW-M4-2	11/06/90	M90-11.39	A	ug/L		0.050
GW-MO5-1	06/20/90	M90-06.101	B	ug/L		5
GW-M5-2	11/06/90	M90-11.39	A	ug/L		0.500
GW-MO6-1	06/21/90	M90-06.101	B	ug/L		0.05
GW-M6-2	11/06/90	M90-11.39	A	ug/L		5.00
GW-MO7-1	06/21/90	M90-06.101	B	ug/L		0.05
GW-M7-2	11/06/90	M90-11.39	A	ug/L		0.050
GW-MO8-1	06/21/90	M90-06.101	B	ug/L		0.05
GW-M8-2	11/06/90	M90-11.39	A	ug/L		0.055
GW-GW1-2	11/08/90	M90-11.39	A	ug/L		0.500
GW-GW2-2	11/08/90	M90-11.39	A	ug/L		0.500
GW-GW3-2	11/08/90	M90-11.39	A	ug/L		0.050
GW-GW4-2	11/12/90	M90-11.61	BA	ug/L		0.050
GW-GW5-2	11/12/90	M90-11.61	BA	ug/L		0.050
GW-GW6-2	11/07/90	M90-11.39	A	ug/L		0.050
GW-GW7-2	11/12/90	M90-11.61	BA	ug/L		0.050
GW-GW8-2	11/08/90	M90-11.39	A	ug/L		0.050
GW-GW9-2	11/09/90	M90-11.39	A	ug/L		0.050

POLYNUCLEAR AROMATIC HYDROCARBONS (PAHs)
IN GROUND WATER

GW-GW10-2	11/08/90	M90-11.39	A	ug/L		0.050
GW-GW11-2	11/09/90	M90-11.39	A	ug/L		0.050
GW-GW12-2	11/07/90	M90-11.39	A	ug/L		0.050
GW-GW13-2	11/08/90	M90-11.39	A	ug/L		0.050
GW-GW14-2	11/07/90	M90-11.39	A	ug/L		0.136
GW-GW15-2	11/08/90	M90-11.39	A	ug/L		0.050
GW-GW16-2	11/09/90	M90-11.39	A	ug/L		0.050
GW-GW17-2	11/08/90	M90-11.39	A	ug/L		0.050
GW-MT MORIAH	11/12/90	M90-11.61	BA	ug/L		0.050
GW-BONTEMPO	11/12/90	M90-11.61	BA	ug/L		0.050
GW15	12/07/90	M90-12.64		ug/L	12 HRS	
GW15	12/08/90	M90-12.64		ug/L	24 HRS	
GW15	12/08/90	M90-12.64		ug/L	36 HRS	
GW15	12/09/90	M90-12.64		ug/L	46 HRS	
GW-M30-1	06/22/90	M90-06.101	B	ug/L	Rinsate Blank	0.05
GW-M33-1	06//25/90	M90-06.117	BA	ug/L	Rinsate Blank	0.05
GW-R10-2	11/06/90	M90-11.39	A	ug/L	Rinsate Blank	0.050
GW-R11-2	11/08/90	M90-11.39	A	ug/L	Rinsate Blank	0.050
GW-R12-2	11/12/90	M90-11.61	BA	ug/L	Rinsate Blank	0.050
GW-GWP-2	11/07/90	M90-11.39	A	ug/L	PE	0.050
SW-100-1	07/12/90	M90-07.44	B	ug/L	Aqueous Bottle	0.03

POLYNUCLEAR AROMATIC HYDROCARBONS (PAHs)
IN GROUND WATER

LOCATION/WELL	DATE	WORK ORDER	A/B LEVEL	UNITS	COMMENTS	Indeno(1,2,3-cd)pyrene
GW-W01-1	06/26/90	M90-06.125	B	ug/L		0.05
GW-W1-2	11/07/90	M90-11.39	A	ug/L		0.050
GW-WO2-1	06/22/90	M90-06.101	B	ug/L		0.5
GW-W2-2	11/09/90	M90-11.39	A	ug/L		0.050
GW-WO3-1	06/22/90	M90-06.101	B	ug/L		0.05
GW-W90-1	06/22/90	M90-06.101	B	ug/L	Field Duplicate of GW-W03-1	0.05
GW-W3-2	11/07/90	M90-11.39	A	ug/L		0.050
GW-W04-1	06/25/90	M90-06.117	BA	ug/L		93.1
GW-W4-2	11/11/90	M90-11.61	BA	ug/L		0.050
GW-W9Q-2	11/11/90	M90-11.61	BA	ug/L	Field Duplicate of GW-0W4-2	0.500
GW-WO5-1	06/22/90	M90-06.101	B	ug/L		500
GW-W5-2	11/11/90	M90-11.61	BA	ug/L		0.050
GW-W05-1	06/25/90	M90-07.14	B	ug/kg	Product	25000
GW-WO6-1	06/25/90	M90-06.101	B	ug/L		0.5
GW-W6-2	11/07/90	M90-11.39	A	ug/L		50.0
GW-W08-1	06/25/90	M90-06.117	BA	ug/L		2000
GW-W8-2	11/11/90	M90-11.61	BA	ug/L		0.500
GW-W08-1	06/28/90	M90-07.14	B	ug/kg	Product	5000
GW-W8-2	11/11/90	M90-11.79	BA	ug/kg	Product	258
GW-W09-1	06/25/90	M90-06.117	BA	ug/L		0.05
GW-W9-2	11/12/90	M90-11.61	BA	ug/L		0.050
GW-W10-1	06/26/90	M89-06.125	B	ug/L		5
GW-W10-2	11/09/90	M90-11.39	A	ug/L		5.00
GW-W9P-2	11/09/90	M90-11.39	A	ug/L	Field Duplicate of GW-W10-2	0.050
GW-W11-1	06/25/90	M90-06.117	BA	ug/L		0.573
GW-W11-2	11/12/90	M90-11.61	BA	ug/L		5.00
GW-W13-1	06/25/90	M90-06.117	BA	ug/L		50
GW-W13-2	11/11/90	M90-11.61	BA	ug/L		5.00
GW-WO14-1	06/21/90	M90-06.101	B	ug/L		0.05
GW-W14-2	11/12/90	M90-11.61	BA	ug/L		0.050
GW-W15-1	06/25/90	M90-06.125	B	ug/L		200
GW-W93-1	06/25/90	M90-06.125	B	ug/L	Field Duplicate of GW-W15-1	200
GW-W15-2	11/11/90	M90-11.61	BA	ug/L		0.500
GW-WO16-1	06/21/90	M90-06.101	B	ug/L		0.05
GW-W16-2	11/12/90	M90-11.61	BA	ug/L		0.050
GW-MO1-1	06/21/90	M90-06.101	B	ug/L		0.05
GW-M1-2	11/07/90	M90-11.39	A	ug/L		0.050
GW-MO2-1	06/21/90	M90-06.101	B	ug/L		0.05
GW-M2-2	11/06/90	M90-11.39	A	ug/L		0.050
GW-W9M-2	11/06/90	M90-11.39	A	ug/L	Field Duplicate of GW-M2-2	0.050
GW-MO3-1	06/21/90	M90-06.101	B	ug/L		0.05
GW-M3-2	11/06/90	M90-11.39	A	ug/L		0.050
GW-MO4-1	06/20/90	M90-06.101	B	ug/L		0.05
GW-M4-2	11/06/90	M90-11.39	A	ug/L		0.050
GW-MO5-1	06/20/90	M90-06.101	B	ug/L		5
GW-M5-2	11/06/90	M90-11.39	A	ug/L		0.500
GW-MO6-1	06/21/90	M90-06.101	B	ug/L		0.05
GW-M6-2	11/06/90	M90-11.39	A	ug/L		5.00
GW-MO7-1	06/21/90	M90-06.101	B	ug/L		0.05
GW-M7-2	11/06/90	M90-11.39	A	ug/L		0.050
GW-MO8-1	06/21/90	M90-06.101	B	ug/L		0.05
GW-M8-2	11/06/90	M90-11.39	A	ug/L		0.050
GW-GW1-2	11/08/90	M90-11.39	A	ug/L		0.500
GW-GW2-2	11/08/90	M90-11.39	A	ug/L		0.500
GW-GW3-2	11/08/90	M90-11.39	A	ug/L		0.050
GW-GW4-2	11/12/90	M90-11.61	BA	ug/L		0.050
GW-GW5-2	11/12/90	M90-11.61	BA	ug/L		0.050
GW-GW6-2	11/07/90	M90-11.39	A	ug/L		0.050
GW-GW7-2	11/12/90	M90-11.61	BA	ug/L		0.050
GW-GW8-2	11/08/90	M90-11.39	A	ug/L		0.050
GW-GW9-2	11/09/90	M90-11.39	A	ug/L		0.050

POLYNUCLEAR AROMATIC HYDROCARBONS (PAHs)
IN GROUND WATER

GW-GW10-2	11/08/90	M90-11.39	A	ug/L		0.050
GW-GW11-2	11/09/90	M90-11.39	A	ug/L		0.050
GW-GW12-2	11/07/90	M90-11.39	A	ug/L		0.050
GW-GW13-2	11/08/90	M90-11.39	A	ug/L		0.050
GW-GW14-2	11/07/90	M90-11.39	A	ug/L		0.104
GW-GW15-2	11/08/90	M90-11.39	A	ug/L		0.050
GW-GW16-2	11/09/90	M90-11.39	A	ug/L		0.050
GW-GW17-2	11/08/90	M90-11.39	A	ug/L		0.050
GW-MT MORIAH	11/12/90	M90-11.61	BA	ug/L		0.050
GW-BONTEMPO	11/12/90	M90-11.61	BA	ug/L		0.050
GW15	12/07/90	M90-12.64		ug/L	12 HRS	
GW15	12/08/90	M90-12.64		ug/L	24 HRS	
GW15	12/08/90	M90-12.64		ug/L	36 HRS	
GW15	12/09/90	M90-12.64		ug/L	46 HRS	
GW-M30-1	06/22/90	M90-06.101	B	ug/L	Rinsate Blank	0.05
GW-M33-1	06//25/90	M90-06.117	BA	ug/L	Rinsate Blank	0.05
GW-R10-2	11/06/90	M90-11.39	A	ug/L	Rinsate Blank	0.050
GW-R11-2	11/08/90	M90-11.39	A	ug/L	Rinsate Blank	0.050
GW-R12-2	11/12/90	M90-11.61	BA	ug/L	Rinsate Blank	0.050
GW-GWP-2	11/07/90	M90-11.39	A	ug/L	PE	0.050
SW-100-1	07/12/90	M90-07.44	B	ug/L	Aqueous Bottle	0.05

CLP ORGANICS
IN GROUND WATER

LOCATION/WELL	DATE SAMPLED	DILUTION	WORK ORDER	UNITS		Chloromethane	Bromomethane	Vinyl Chloride	Chloroethane
GW-W04-1	06/25/90	5.0	H90-06.155	ug/L		50	50	50	50
GW-W4-2	11/11/90	5.0	H90-11.63	ug/L		50	50	50	50
GW-W9Q-2	11/11/90	25	H90-11.63	ug/L	Field Duplicate of GW-W4-2	250	250	250	250
GW-W05-1	06/22/90	5.0	H90-06.155	ug/L		50	50	50	50
GW-W05-1	NA	--	H90-06.155	ug/L					
GW-W5-2	11/11/90	5.0	H90-11.63	ug/L		50	50	50	50
GW-W08-1	06/25/90	20	H90-06.155	ug/L		200	200	200	200
GW-W8-2	11/11/90	25	H90-11.63	ug/L		250	250	250	250
GW-W13-1	06/25/90	5.0	H90-06.155	ug/L		50	50	50	50
GW-W13-2	11/11/90	5.0	H90-11.63	ug/L		50	50	50	50
GW-W15-1	06/25/90	5.0	H90-06.155	ug/L		50	50	50	50
GW-W93-1	06/25/90	5.0	H90-06.155	ug/L	Field Duplicate of GW-W15-1	50	50	50	50
GW-W15-2	11/11/90	5.0	H90-11.63	ug/L		50	50	50	50
GW-GW6-2	11/07/90	1.0	H90-11.46	ug/L		10	10	10	10
GW-GW15-2	11/08/90	1.0	H90-11.46	ug/L		10	10	10	10
GW-GW17-2	11/08/90	1.0	H90-11.46	ug/L		10	10	10	10
GW-W92-1	06/22/90	1.0	H90-06.155	ug/L	Field Blank	10	10	10	10
GW-M32-1	06/22/90	1.0	H90-06.155	ug/L	Trip Blank	10	10	10	10
GW-M33-1	06/25/90	1.0	H90-06.155	ug/L	Rinsate Blank	10	10	10	10
GW-M34-1	06/25/90	1.0	H90-06.155	ug/L	Trip Blank	10	10	10	10
GW-M31-2	11/08/90	1.0	H90-11.46	ug/L	Trip Blank	10	10	10	10
GW-M32-2	11/09/90	1.0	H90-11.46	ug/L	Trip Blank	10	10	10	10
GW-M33-2	11/12/90	1.0	H90-11.63	ug/L	Trip Blank	10	10	10	10
GW-R11-2	11/08/90	1.0	H90-11.46	ug/L	Rinsate Blank	10	10	10	10
GW-W8Q-2	11/12/90	1.0	H90-11.63	ug/L	Field Blank	10	10	10	10
GW-GWP-2	11/14/90	1.0	H90-11.76	ug/L	PE Sample	10	10	10	10
SW-100-01	07/12/90	1.0	H90-07.53	ug/L	Aqueous Bottle Blank	10	10	10	10

CLP ORGANICS
IN GROUND WATER

LOCATION/WELL	DATE SAMPLED	DILUTION	WORK ORDER	UNITS		Methylene Chloride	Acetone	Carbon Disulfide	1,1-Dichloroethene
GW-W04-1	06/25/90	5.0	H90-06.155	ug/L		67	470	25	25
GW-W4-2	11/11/90	5.0	H90-11.63	ug/L		25	50	25	25
GW-W9Q-2	11/11/90	25	H90-11.63	ug/L	Field Duplicate of GW-W4-2	120	250	120	120
GW-W05-1	06/22/90	5.0	H90-06.155	ug/L		23	710	25	25
GW-W05-1	NA	--	H90-06.155	ug/L					
GW-W5-2	11/11/90	5.0	H90-11.63	ug/L		25	50	25	25
GW-W08-1	06/25/90	20	H90-06.155	ug/L		130	1100	100	100
GW-W8-2	11/11/90	25	H90-11.63	ug/L		120	250	120	120
GW-W13-1	06/25/90	5.0	H90-06.155	ug/L		66	660	25	25
GW-W13-2	11/11/90	5.0	H90-11.63	ug/L		25	50	25	25
GW-W15-1	06/25/90	5.0	H90-06.155	ug/L		71	290	25	25
GW-W93-1	06/25/90	5.0	H90-06.155	ug/L	Field Duplicate of GW-W15-1	25	220	25	25
GW-W15-2	11/11/90	5.0	H90-11.63	ug/L		25	50	25	25
GW-GW6-2	11/07/90	1.0	H90-11.46	ug/L		5	10	5	5
GW-GW15-2	11/08/90	1.0	H90-11.46	ug/L		5	10	5	5
GW-GW17-2	11/08/90	1.0	H90-11.46	ug/L		5	10	5	5
GW-W92-1	06/22/90	1.0	H90-06.155	ug/L	Field Blank	13	9	5	5
GW-M32-1	06/22/90	1.0	H90-06.155	ug/L	Trip Blank	9	12	5	5
GW-M33-1	06/25/90	1.0	H90-06.155	ug/L	Rinsate Blank	8	22	5	5
GW-M34-1	06/25/90	1.0	H90-06.155	ug/L	Trip Blank	4	19	5	5
GW-M31-2	11/08/90	1.0	H90-11.46	ug/L	Trip Blank	5	10	5	5
GW-M32-2	11/09/90	1.0	H90-11.46	ug/L	Trip Blank	5	10	5	5
GW-M33-2	11/12/90	1.0	H90-11.63	ug/L	Trip Blank	5	28	5	5
GW-R11-2	11/08/90	1.0	H90-11.46	ug/L	Rinsate Blank	5	10	5	5
GW-W8Q-2	11/12/90	1.0	H90-11.63	ug/L	Field Blank	5	10	5	5
GW-GWP-2	11/14/90	1.0	H90-11.76	ug/L	PE Sample	160	10	5	5
SW-100-01	07/12/90	1.0	H90-07.53	ug/L	Aqueous Bottle Blank	20	33	5	5

CLP ORGANICS
IN GROUND WATER

LOCATION/WELL	DATE SAMPLED	DILUTION	WORK ORDER	UNITS		1,1-Dichloroethane	1,2-Dichloroethene (total)	Chloroform
GW-W04-1	06/25/90	5.0	H90-06.155	ug/L		25	25	25
GW-W4-2	11/11/90	5.0	H90-11.63	ug/L		25	25	25
GW-W9Q-2	11/11/90	25	H90-11.63	ug/L	Field Duplicate of GW-W4-2	120	120	120
GW-W05-1	06/22/90	5.0	H90-06.155	ug/L		25	25	25
GW-W05-1	NA	--	H90-06.155	ug/L				
GW-W5-2	11/11/90	5.0	H90-11.63	ug/L		25	25	25
GW-W08-1	06/25/90	20	H90-06.155	ug/L		100	100	100
GW-W8-2	11/11/90	25	H90-11.63	ug/L		120	120	120
GW-W13-1	06/25/90	5.0	H90-06.155	ug/L		25	25	25
GW-W13-2	11/11/90	5.0	H90-11.63	ug/L		25	25	25
GW-W15-1	06/25/90	5.0	H90-06.155	ug/L		25	25	25
GW-W93-1	06/25/90	5.0	H90-06.155	ug/L	Field Duplicate of GW-W15-1	25	25	25
GW-W15-2	11/11/90	5.0	H90-11.63	ug/L		25	25	25
GW-GW6-2	11/07/90	1.0	H90-11.46	ug/L		5	5	5
GW-GW15-2	11/08/90	1.0	H90-11.46	ug/L		5	5	5
GW-GW17-2	11/08/90	1.0	H90-11.46	ug/L		5	5	5
GW-W92-1	06/22/90	1.0	H90-06.155	ug/L	Field Blank	5	5	9
GW-M32-1	06/22/90	1.0	H90-06.155	ug/L	Trip Blank	5	5	5
GW-M33-1	06/25/90	1.0	H90-06.155	ug/L	Rinsate Blank	5	5	5
GW-M34-1	06/25/90	1.0	H90-06.155	ug/L	Trip Blank	5	5	3
GW-M31-2	11/08/90	1.0	H90-11.46	ug/L	Trip Blank	5	5	7
GW-M32-2	11/09/90	1.0	H90-11.46	ug/L	Trip Blank	5	5	7
GW-M33-2	11/12/90	1.0	H90-11.63	ug/L	Trip Blank	5	5	5
GW-R11-2	11/08/90	1.0	H90-11.46	ug/L	Rinsate Blank	5	5	6
GW-W8Q-2	11/12/90	1.0	H90-11.63	ug/L	Field Blank	5	5	6
GW-GWP-2	11/14/90	1.0	H90-11.76	ug/L	PE Sample	5	24	19
SW-100-01	07/12/90	1.0	H90-07.53	ug/L	Aqueous Bottle Blank	5	5	17

CLP ORGANICS
IN GROUND WATER

LOCATION/WELL	DATE SAMPLED	DILUTION	WORK ORDER	UNITS		1,2-Dichloroethane	2-Butanone	1,1,1-Trichloroethane
GW-W04-1	06/25/90	5.0	H90-06.155	ug/L		25	50	25
GW-W4-2	11/11/90	5.0	H90-11.63	ug/L		25	50	25
GW-W9Q-2	11/11/90	25	H90-11.63	ug/L	Field Duplicate of GW-W4-2	120	250	120
GW-W05-1	06/22/90	5.0	H90-06.155	ug/L		25	50	25
GW-W05-1	NA	--	H90-06.155	ug/L				
GW-W5-2	11/11/90	5.0	H90-11.63	ug/L		25	50	25
GW-W08-1	06/25/90	20	H90-06.155	ug/L		100	200	100
GW-W8-2	11/11/90	25	H90-11.63	ug/L		120	250	120
GW-W13-1	06/25/90	5.0	H90-06.155	ug/L		25	50	25
GW-W13-2	11/11/90	5.0	H90-11.63	ug/L		25	50	25
GW-W15-1	06/25/90	5.0	H90-06.155	ug/L		25	50	25
GW-W93-1	06/25/90	5.0	H90-06.155	ug/L	Field Duplicate of GW-W15-1	25	50	25
GW-W15-2	11/11/90	5.0	H90-11.63	ug/L		25	50	25
GW-GW6-2	11/07/90	1.0	H90-11.46	ug/L		5	10	5
GW-GW15-2	11/08/90	1.0	H90-11.46	ug/L		5	10	5
GW-GW17-2	11/08/90	1.0	H90-11.46	ug/L		5	10	5
GW-W92-1	06/22/90	1.0	H90-06.155	ug/L	Field Blank	5	10	5
GW-M32-1	06/22/90	1.0	H90-06.155	ug/L	Trip Blank	5	10	5
GW-M33-1	06/25/90	1.0	H90-06.155	ug/L	Rinsate Blank	5	10	5
GW-M34-1	06/25/90	1.0	H90-06.155	ug/L	Trip Blank	5	10	5
GW-M31-2	11/08/90	1.0	H90-11.46	ug/L	Trip Blank	5	10	5
GW-M32-2	11/09/90	1.0	H90-11.46	ug/L	Trip Blank	5	10	5
GW-M33-2	11/12/90	1.0	H90-11.63	ug/L	Trip Blank	5	60	5
GW-R11-2	11/08/90	1.0	H90-11.46	ug/L	Rinsate Blank	5	10	5
GW-W8Q-2	11/12/90	1.0	H90-11.63	ug/L	Field Blank	5	10	5
GW-GWP-2	11/14/90	1.0	H90-11.76	ug/L	PE Sample	7	10	46
SW-100-01	07/12/90	1.0	H90-07.53	ug/L	Aqueous Bottle Blank	5	10	5

CLP ORGANICS
IN GROUND WATER

LOCATION/WELL	DATE SAMPLED	DILUTION	WORK ORDER	UNITS		Carbon Tetrachloride	Vinyl Acetate	Bromodichloromethane
GW-W04-1	06/25/90	5.0	H90-06.155	ug/L		25	50	25
GW-W4-2	11/11/90	5.0	H90-11.63	ug/L		25	50	25
GW-W9Q-2	11/11/90	25	H90-11.63	ug/L	Field Duplicate of GW-W4-2	120	250	120
GW-W05-1	06/22/90	5.0	H90-06.155	ug/L		25	50	25
GW-W05-1	NA	--	H90-06.155	ug/L				
GW-W5-2	11/11/90	5.0	H90-11.63	ug/L		25	50	25
GW-W08-1	06/25/90	20	H90-06.155	ug/L		100	200	100
GW-W8-2	11/11/90	25	H90-11.63	ug/L		120	250	120
GW-W13-1	06/25/90	5.0	H90-06.155	ug/L		25	50	25
GW-W13-2	11/11/90	5.0	H90-11.63	ug/L		25	50	25
GW-W15-1	06/25/90	5.0	H90-06.155	ug/L		25	50	25
GW-W93-1	06/25/90	5.0	H90-06.155	ug/L	Field Duplicate of GW-W15-1	25	50	25
GW-W15-2	11/11/90	5.0	H90-11.63	ug/L		25	50	25
GW-GW6-2	11/07/90	1.0	H90-11.46	ug/L		5	10	5
GW-GW15-2	11/08/90	1.0	H90-11.46	ug/L		5	10	5
GW-GW17-2	11/08/90	1.0	H90-11.46	ug/L		5	10	5
GW-W92-1	06/22/90	1.0	H90-06.155	ug/L	Field Blank	5	10	5
GW-M32-1	06/22/90	1.0	H90-06.155	ug/L	Trip Blank	5	10	5
GW-M33-1	06/25/90	1.0	H90-06.155	ug/L	Rinsate Blank	5	10	5
GW-M34-1	06/25/90	1.0	H90-06.155	ug/L	Trip Blank	5	10	5
GW-M31-2	11/08/90	1.0	H90-11.46	ug/L	Trip Blank	5	10	5
GW-M32-2	11/09/90	1.0	H90-11.46	ug/L	Trip Blank	5	10	5
GW-M33-2	11/12/90	1.0	H90-11.63	ug/L	Trip Blank	5	10	5
GW-R11-2	11/08/90	1.0	H90-11.46	ug/L	Rinsate Blank	5	10	5
GW-W8Q-2	11/12/90	1.0	H90-11.63	ug/L	Field Blank	5	10	5
GW-GWP-2	11/14/90	1.0	H90-11.76	ug/L	PE Sample	93	10	12
SW-100-01	07/12/90	1.0	H90-07.53	ug/L	Aqueous Bottle Blank	5	10	5

CLP ORGANICS
IN GROUND WATER

LOCATION/WELL	DATE SAMPLED	DILUTION	WORK ORDER	UNITS		1,2-Dichloropropane	cis-1,3-Dichloropropene	Trichloroethene
GW-W04-1	06/25/90	5.0	H90-06.155	ug/L		25	25	25
GW-W4-2	11/11/90	5.0	H90-11.63	ug/L		25	25	25
GW-W9Q-2	11/11/90	25	H90-11.63	ug/L	Field Duplicate of GW-W4-2	120	120	120
GW-W05-1	06/22/90	5.0	H90-06.155	ug/L		25	25	25
GW-W05-1	NA	--	H90-06.155	ug/L				
GW-W5-2	11/11/90	5.0	H90-11.63	ug/L		25	25	25
GW-W08-1	06/25/90	20	H90-06.155	ug/L		100	100	100
GW-W8-2	11/11/90	25	H90-11.63	ug/L		120	120	120
GW-W13-1	06/25/90	5.0	H90-06.155	ug/L		25	25	25
GW-W13-2	11/11/90	5.0	H90-11.63	ug/L		25	25	25
GW-W15-1	06/25/90	5.0	H90-06.155	ug/L		25	25	25
GW-W93-1	06/25/90	5.0	H90-06.155	ug/L	Field Duplicate of GW-W15-1	25	25	25
GW-W15-2	11/11/90	5.0	H90-11.63	ug/L		25	25	25
GW-GW6-2	11/07/90	1.0	H90-11.46	ug/L		5	5	5
GW-GW15-2	11/08/90	1.0	H90-11.46	ug/L		5	5	5
GW-GW17-2	11/08/90	1.0	H90-11.46	ug/L		5	5	5
GW-W92-1	06/22/90	1.0	H90-06.155	ug/L	Field Blank	5	5	5
GW-M32-1	06/22/90	1.0	H90-06.155	ug/L	Trip Blank	5	5	5
GW-M33-1	06/25/90	1.0	H90-06.155	ug/L	Rinsate Blank	5	5	5
GW-M34-1	06/25/90	1.0	H90-06.155	ug/L	Trip Blank	5	5	5
GW-M31-2	11/08/90	1.0	H90-11.46	ug/L	Trip Blank	5	5	5
GW-M32-2	11/09/90	1.0	H90-11.46	ug/L	Trip Blank	5	5	5
GW-M33-2	11/12/90	1.0	H90-11.63	ug/L	Trip Blank	5	5	5
GW-R11-2	11/08/90	1.0	H90-11.46	ug/L	Rinsate Blank	5	5	5
GW-W8Q-2	11/12/90	1.0	H90-11.63	ug/L	Field Blank	5	5	5
GW-GWP-2	11/14/90	1.0	H90-11.76	ug/L	PE Sample	5	5	49
SW-100-01	07/12/90	1.0	H90-07.53	ug/L	Aqueous Bottle Blank	5	5	5

CLP ORGANICS
IN GROUND WATER

LOCATION/WELL	DATE SAMPLED	DILUTION	WORK ORDER	UNITS		Dibromochloromethane	1,1,2-Trichloroethane	Benzene
GW-W04-1	06/25/90	5.0	H90-06.155	ug/L		25	25	25
GW-W4-2	11/11/90	5.0	H90-11.63	ug/L		25	25	25
GW-W9Q-2	11/11/90	25	H90-11.63	ug/L	Field Duplicate of GW-W4-2	120	120	120
GW-W05-1	06/22/90	5.0	H90-06.155	ug/L		25	25	25
GW-W05-1	NA	--	H90-06.155	ug/L				
GW-W5-2	11/11/90	5.0	H90-11.63	ug/L		25	25	25
GW-W08-1	06/25/90	20	H90-06.155	ug/L		100	100	100
GW-W8-2	11/11/90	25	H90-11.63	ug/L		120	120	120
GW-W13-1	06/25/90	5.0	H90-06.155	ug/L		25	25	25
GW-W13-2	11/11/90	5.0	H90-11.63	ug/L		25	25	25
GW-W15-1	06/25/90	5.0	H90-06.155	ug/L		25	25	25
GW-W93-1	06/25/90	5.0	H90-06.155	ug/L	Field Duplicate of GW-W15-1	25	25	25
GW-W15-2	11/11/90	5.0	H90-11.63	ug/L		25	25	25
GW-GW6-2	11/07/90	1.0	H90-11.46	ug/L		5	5	5
GW-GW15-2	11/08/90	1.0	H90-11.46	ug/L		5	5	5
GW-GW17-2	11/08/90	1.0	H90-11.46	ug/L		5	5	5
GW-W92-1	06/22/90	1.0	H90-06.155	ug/L	Field Blank	5	5	5
GW-M32-1	06/22/90	1.0	H90-06.155	ug/L	Trip Blank	5	5	5
GW-M33-1	06/25/90	1.0	H90-06.155	ug/L	Rinsate Blank	5	5	5
GW-M34-1	06/25/90	1.0	H90-06.155	ug/L	Trip Blank	5	5	5
GW-M31-2	11/08/90	1.0	H90-11.46	ug/L	Trip Blank	5	5	5
GW-M32-2	11/09/90	1.0	H90-11.46	ug/L	Trip Blank	5	5	5
GW-M33-2	11/12/90	1.0	H90-11.63	ug/L	Trip Blank	5	5	5
GW-R11-2	11/08/90	1.0	H90-11.46	ug/L	Rinsate Blank	5	5	5
GW-W8Q-2	11/12/90	1.0	H90-11.63	ug/L	Field Blank	5	5	5
GW-GWP-2	11/14/90	1.0	H90-11.76	ug/L	PE Sample	5	5	75
SW-100-01	07/12/90	1.0	H90-07.53	ug/L	Aqueous Bottle Blank	5	5	5

CLP ORGANICS
IN GROUND WATER

LOCATION/WELL	DATE SAMPLED	DILUTION	WORK ORDER	UNITS		trans-1,3-Dichloropropene	Bromoform
GW-W04-1	06/25/90	5.0	H90-06.155	ug/L		25	25
GW-W4-2	11/11/90	5.0	H90-11.63	ug/L		25	25
GW-W9Q-2	11/11/90	25	H90-11.63	ug/L	Field Duplicate of GW-W4-2	120	120
GW-W05-1	06/22/90	5.0	H90-06.155	ug/L		25	25
GW-W05-1	NA	--	H90-06.155	ug/L			
GW-W5-2	11/11/90	5.0	H90-11.63	ug/L		25	25
GW-W08-1	06/25/90	20	H90-06.155	ug/L		100	100
GW-W8-2	11/11/90	25	H90-11.63	ug/L		120	120
GW-W13-1	06/25/90	5.0	H90-06.155	ug/L		25	25
GW-W13-2	11/11/90	5.0	H90-11.63	ug/L		25	25
GW-W15-1	06/25/90	5.0	H90-06.155	ug/L		25	25
GW-W93-1	06/25/90	5.0	H90-06.155	ug/L	Field Duplicate of GW-W15-1	25	25
GW-W15-2	11/11/90	5.0	H90-11.63	ug/L		25	25
GW-GW6-2	11/07/90	1.0	H90-11.46	ug/L		5	5
GW-GW15-2	11/08/90	1.0	H90-11.46	ug/L		5	5
GW-GW17-2	11/08/90	1.0	H90-11.46	ug/L		5	5
GW-W92-1	06/22/90	1.0	H90-06.155	ug/L	Field Blank	5	5
GW-M32-1	06/22/90	1.0	H90-06.155	ug/L	Trip Blank	5	5
GW-M33-1	06/25/90	1.0	H90-06.155	ug/L	Rinsate Blank	5	5
GW-M34-1	06/25/90	1.0	H90-06.155	ug/L	Trip Blank	5	5
GW-M31-2	11/08/90	1.0	H90-11.46	ug/L	Trip Blank	5	5
GW-M32-2	11/09/90	1.0	H90-11.46	ug/L	Trip Blank	5	5
GW-M33-2	11/12/90	1.0	H90-11.63	ug/L	Trip Blank	5	5
GW-R11-2	11/08/90	1.0	H90-11.46	ug/L	Rinsate Blank	5	5
GW-W8Q-2	11/12/90	1.0	H90-11.63	ug/L	Field Blank	5	5
GW-GWP-2	11/14/90	1.0	H90-11.76	ug/L	PE Sample	5	76
SW-100-01	07/12/90	1.0	H90-07.53	ug/L	Aqueous Bottle Blank	5	5

CLP ORGANICS
IN GROUND WATER

LOCATION/WELL	DATE SAMPLED	DILUTION	WORK ORDER	UNITS		4-Methyl-2-Pentanone	2-Hexanone	Tetrachloroethene
GW-W04-1	06/25/90	5.0	H90-06.155	ug/L		50	50	25
GW-W4-2	11/11/90	5.0	H90-11.63	ug/L		50	50	25
GW-W9Q-2	11/11/90	25	H90-11.63	ug/L	Field Duplicate of GW-W4-2	250	250	120
GW-W05-1	06/22/90	5.0	H90-06.155	ug/L		50	50	25
GW-W05-1	NA	--	H90-06.155	ug/L				
GW-W5-2	11/11/90	5.0	H90-11.63	ug/L		50	50	25
GW-W08-1	06/25/90	20	H90-06.155	ug/L		200	200	100
GW-W8-2	11/11/90	25	H90-11.63	ug/L		250	250	120
GW-W13-1	06/25/90	5.0	H90-06.155	ug/L		50	50	25
GW-W13-2	11/11/90	5.0	H90-11.63	ug/L		50	50	25
GW-W15-1	06/25/90	5.0	H90-06.155	ug/L		50	50	25
GW-W93-1	06/25/90	5.0	H90-06.155	ug/L	Field Duplicate of GW-W15-1	50	50	25
GW-W15-2	11/11/90	5.0	H90-11.63	ug/L		50	50	25
GW-GW6-2	11/07/90	1.0	H90-11.46	ug/L		10	10	5
GW-GW15-2	11/08/90	1.0	H90-11.46	ug/L		10	10	5
GW-GW17-2	11/08/90	1.0	H90-11.46	ug/L		10	10	5
GW-W92-1	06/22/90	1.0	H90-06.155	ug/L	Field Blank	10	10	5
GW-M32-1	06/22/90	1.0	H90-06.155	ug/L	Trip Blank	10	10	5
GW-M33-1	06/25/90	1.0	H90-06.155	ug/L	Rinsate Blank	10	10	5
GW-M34-1	06/25/90	1.0	H90-06.155	ug/L	Trip Blank	10	10	5
GW-M31-2	11/08/90	1.0	H90-11.46	ug/L	Trip Blank	10	10	5
GW-M32-2	11/09/90	1.0	H90-11.46	ug/L	Trip Blank	10	10	5
GW-M33-2	11/12/90	1.0	H90-11.63	ug/L	Trip Blank	10	10	5
GW-R11-2	11/08/90	1.0	H90-11.46	ug/L	Rinsate Blank	10	10	5
GW-W8Q-2	11/12/90	1.0	H90-11.63	ug/L	Field Blank	10	10	5
GW-GWP-2	11/14/90	1.0	H90-11.76	ug/L	PE Sample	10	10	32
SW-100-01	07/12/90	1.0	H90-07.53	ug/L	Aqueous Bottle Blank	10	10	5

CLP ORGANICS
IN GROUND WATER

LOCATION/WELL	DATE SAMPLED	DILUTION	WORK ORDER	UNITS		1,1,2,2-Tetrachloroethane	Toluene	Chlorobenzene	Ethylbenzene
GW-W04-1	06/25/90	5.0	H90-06.155	ug/L		25	25	25	25
GW-W4-2	11/11/90	5.0	H90-11.63	ug/L		25	25	25	25
GW-W9Q-2	11/11/90	25	H90-11.63	ug/L	Field Duplicate of GW-W4-2	120	120	120	120
GW-W05-1	06/22/90	5.0	H90-06.155	ug/L		25	25	25	13
GW-W05-1	NA	--	H90-06.155	ug/L					
GW-W5-2	11/11/90	5.0	H90-11.63	ug/L		25	7	25	25
GW-W08-1	06/25/90	20	H90-06.155	ug/L		100	59	100	59
GW-W8-2	11/11/90	25	H90-11.63	ug/L		120	66	120	64
GW-W13-1	06/25/90	5.0	H90-06.155	ug/L		25	25	25	25
GW-W13-2	11/11/90	5.0	H90-11.63	ug/L		25	25	25	25
GW-W15-1	06/25/90	5.0	H90-06.155	ug/L		25	25	25	25
GW-W93-1	06/25/90	5.0	H90-06.155	ug/L	Field Duplicate of GW-W15-1	25	16	25	25
GW-W15-2	11/11/90	5.0	H90-11.63	ug/L		25	6	25	25
GW-GW6-2	11/07/90	1.0	H90-11.46	ug/L		5	5	5	5
GW-GW15-2	11/08/90	1.0	H90-11.46	ug/L		5	5	5	5
GW-GW17-2	11/08/90	1.0	H90-11.46	ug/L		5	5	5	5
GW-W92-1	06/22/90	1.0	H90-06.155	ug/L	Field Blank	5	5	5	5
GW-M32-1	06/22/90	1.0	H90-06.155	ug/L	Trip Blank	5	5	5	5
GW-M33-1	06/25/90	1.0	H90-06.155	ug/L	Rinsate Blank	5	5	5	5
GW-M34-1	06/25/90	1.0	H90-06.155	ug/L	Trip Blank	5	5	5	5
GW-M31-2	11/08/90	1.0	H90-11.46	ug/L	Trip Blank	5	5	5	5
GW-M32-2	11/09/90	1.0	H90-11.46	ug/L	Trip Blank	5	5	5	5
GW-M33-2	11/12/90	1.0	H90-11.63	ug/L	Trip Blank	5	5	5	5
GW-R11-2	11/08/90	1.0	H90-11.46	ug/L	Rinsate Blank	5	5	5	5
GW-W8Q-2	11/12/90	1.0	H90-11.63	ug/L	Field Blank	5	5	5	5
GW-GWP-2	11/14/90	1.0	H90-11.76	ug/L	PE Sample	51	15	87	7
SW-100-01	07/12/90	1.0	H90-07.53	ug/L	Aqueous Bottle Blank	5	5	5	5

CLP ORGANICS
IN GROUND WATER

LOCATION/WELL	DATE SAMPLED	DILUTION	WORK ORDER	UNITS		Styrene	Xylene (total)	Phenol	bis(2-Chloroethyl) Ether
GW-W04-1	06/25/90	5.0	H90-06.155	ug/L		25	20	3500	3500
GW-W4-2	11/11/90	5.0	H90-11.63	ug/L		25	13	500	500
GW-W9Q-2	11/11/90	25	H90-11.63	ug/L	Field Duplicate of GW-W4-2	120	120	500	500
GW-W05-1	06/22/90	5.0	H90-06.155	ug/L		25	150	500	500
GW-W05-1	NA	--	H90-06.155	ug/L				200	200
GW-W5-2	11/11/90	5.0	H90-11.63	ug/L		25	74	100	100
GW-W08-1	06/25/90	20	H90-06.155	ug/L		100	570	200	200
GW-W8-2	11/11/90	25	H90-11.63	ug/L		120	470	500	500
GW-W13-1	06/25/90	5.0	H90-06.155	ug/L		25	28	500	500
GW-W13-2	11/11/90	5.0	H90-11.63	ug/L		25	22	100	100
GW-W15-1	06/25/90	5.0	H90-06.155	ug/L		25	73	2000	2000
GW-W93-1	06/25/90	5.0	H90-06.155	ug/L	Field Duplicate of GW-W15-1	25	84	1000	1000
GW-W15-2	11/11/90	5.0	H90-11.63	ug/L		25	40	20	20
GW-GW6-2	11/07/90	1.0	H90-11.46	ug/L		5	5	10	10
GW-GW15-2	11/08/90	1.0	H90-11.46	ug/L		5	5	10	10
GW-GW17-2	11/08/90	1.0	H90-11.46	ug/L		5	5	10	10
GW-W92-1	06/22/90	1.0	H90-06.155	ug/L	Field Blank	5	5		
GW-M32-1	06/22/90	1.0	H90-06.155	ug/L	Trip Blank	5	5		
GW-M33-1	06/25/90	1.0	H90-06.155	ug/L	Rinsate Blank	5	5	10	10
GW-M34-1	06/25/90	1.0	H90-06.155	ug/L	Trip Blank	5	5		
GW-M31-2	11/08/90	1.0	H90-11.46	ug/L	Trip Blank	5	5		
GW-M32-2	11/09/90	1.0	H90-11.46	ug/L	Trip Blank	5	5		
GW-M33-2	11/12/90	1.0	H90-11.63	ug/L	Trip Blank	5	5		
GW-R11-2	11/08/90	1.0	H90-11.46	ug/L	Rinsate Blank	5	5	2	10
GW-W8Q-2	11/12/90	1.0	H90-11.63	ug/L	Field Blank	5	5		
GW-GWP-2	11/14/90	1.0	H90-11.76	ug/L	PE Sample	5	84	10	10
SW-100-01	07/12/90	1.0	H90-07.53	ug/L	Aqueous Bottle Blank	5	5	10	10

CLP ORGANICS
IN GROUND WATER

LOCATION/WELL	DATE SAMPLED	DILUTION	WORK ORDER	UNITS		2-Chlorophenol	1,3-Dichlorobenzene	1,4-Dichlorobenzene
GW-W04-1	06/25/90	5.0	H90-06.155	ug/L		3500	3500	3500
GW-W4-2	11/11/90	5.0	H90-11.63	ug/L		500	500	500
GW-W9Q-2	11/11/90	25	H90-11.63	ug/L	Field Duplicate of GW-W4-2	500	500	500
GW-W05-1	06/22/90	5.0	H90-06.155	ug/L		500	500	500
GW-W05-1	NA	--	H90-06.155	ug/L		200	200	200
GW-W5-2	11/11/90	5.0	H90-11.63	ug/L		100	100	100
GW-W08-1	06/25/90	20	H90-06.155	ug/L		200	200	200
GW-W8-2	11/11/90	25	H90-11.63	ug/L		500	500	500
GW-W13-1	06/25/90	5.0	H90-06.155	ug/L		500	500	500
GW-W13-2	11/11/90	5.0	H90-11.63	ug/L		100	100	100
GW-W15-1	06/25/90	5.0	H90-06.155	ug/L		2000	2000	2000
GW-W93-1	06/25/90	5.0	H90-06.155	ug/L	Field Duplicate of GW-W15-1	1000	1000	1000
GW-W15-2	11/11/90	5.0	H90-11.63	ug/L		20	20	20
GW-GW6-2	11/07/90	1.0	H90-11.46	ug/L		10	10	10
GW-GW15-2	11/08/90	1.0	H90-11.46	ug/L		10	10	10
GW-GW17-2	11/08/90	1.0	H90-11.46	ug/L		10	10	10
GW-W92-1	06/22/90	1.0	H90-06.155	ug/L	Field Blank			
GW-M32-1	06/22/90	1.0	H90-06.155	ug/L	Trip Blank			
GW-M33-1	06/25/90	1.0	H90-06.155	ug/L	Rinsate Blank	10	10	10
GW-M34-1	06/25/90	1.0	H90-06.155	ug/L	Trip Blank			
GW-M31-2	11/08/90	1.0	H90-11.46	ug/L	Trip Blank			
GW-M32-2	11/09/90	1.0	H90-11.46	ug/L	Trip Blank			
GW-M33-2	11/12/90	1.0	H90-11.63	ug/L	Trip Blank			
GW-R11-2	11/08/90	1.0	H90-11.46	ug/L	Rinsate Blank	10	10	10
GW-W8Q-2	11/12/90	1.0	H90-11.63	ug/L	Field Blank			
GW-GWP-2	11/14/90	1.0	H90-11.76	ug/L	PE Sample	10	6	10
SW-100-01	07/12/90	1.0	H90-07.53	ug/L	Aqueous Bottle Blank	10	10	10

CLP ORGANICS
IN GROUND WATER

LOCATION/WELL	DATE SAMPLED	DILUTION	WORK ORDER	UNITS		Benzyl Alcohol	1,2-Dichlorobenzene	2-Methylphenol
GW-W04-1	06/25/90	5.0	H90-06.155	ug/L		3500	3500	3500
GW-W4-2	11/11/90	5.0	H90-11.63	ug/L		500	500	500
GW-W9Q-2	11/11/90	25	H90-11.63	ug/L	Field Duplicate of GW-W4-2	500	500	500
GW-W05-1	06/22/90	5.0	H90-06.155	ug/L		500	500	500
GW-W05-1	NA	--	H90-06.155	ug/L		200	200	200
GW-W5-2	11/11/90	5.0	H90-11.63	ug/L		100	100	100
GW-W08-1	06/25/90	20	H90-06.155	ug/L		200	200	200
GW-W8-2	11/11/90	25	H90-11.63	ug/L		500	500	500
GW-W13-1	06/25/90	5.0	H90-06.155	ug/L		500	500	500
GW-W13-2	11/11/90	5.0	H90-11.63	ug/L		100	100	100
GW-W15-1	06/25/90	5.0	H90-06.155	ug/L		2000	2000	2000
GW-W93-1	06/25/90	5.0	H90-06.155	ug/L	Field Duplicate of GW-W15-1	1000	1000	1000
GW-W15-2	11/11/90	5.0	H90-11.63	ug/L		20	20	20
GW-GW6-2	11/07/90	1.0	H90-11.46	ug/L		10	10	10
GW-GW15-2	11/08/90	1.0	H90-11.46	ug/L		10	10	10
GW-GW17-2	11/08/90	1.0	H90-11.46	ug/L		10	10	10
GW-W92-1	06/22/90	1.0	H90-06.155	ug/L	Field Blank			
GW-M32-1	06/22/90	1.0	H90-06.155	ug/L	Trip Blank			
GW-M33-1	06/25/90	1.0	H90-06.155	ug/L	Rinsate Blank	10	10	10
GW-M34-1	06/25/90	1.0	H90-06.155	ug/L	Trip Blank			
GW-M31-2	11/08/90	1.0	H90-11.46	ug/L	Trip Blank			
GW-M32-2	11/09/90	1.0	H90-11.46	ug/L	Trip Blank			
GW-M33-2	11/12/90	1.0	H90-11.63	ug/L	Trip Blank			
GW-R11-2	11/08/90	1.0	H90-11.46	ug/L	Rinsate Blank	10	10	10
GW-W8Q-2	11/12/90	1.0	H90-11.63	ug/L	Field Blank			
GW-GWP-2	11/14/90	1.0	H90-11.76	ug/L	PE Sample	10	7	3
SW-100-01	07/12/90	1.0	H90-07.53	ug/L	Aqueous Bottle Blank	10	10	10

CLP ORGANICS
IN GROUND WATER

LOCATION/WELL	DATE SAMPLED	DILUTION	WORK ORDER	UNITS		bis(2-Chloroisopropyl)Ether	4-Methylphenol
GW-W04-1	06/25/90	5.0	H90-06.155	ug/L		3500	3500
GW-W4-2	11/11/90	5.0	H90-11.63	ug/L		500	500
GW-W9Q-2	11/11/90	25	H90-11.63	ug/L	Field Duplicate of GW-W4-2	500	500
GW-W05-1	06/22/90	5.0	H90-06.155	ug/L		500	500
GW-W05-1	NA	--	H90-06.155	ug/L		200	200
GW-W5-2	11/11/90	5.0	H90-11.63	ug/L		100	100
GW-W08-1	06/25/90	20	H90-06.155	ug/L		200	200
GW-W8-2	11/11/90	25	H90-11.63	ug/L		500	500
GW-W13-1	06/25/90	5.0	H90-06.155	ug/L		500	500
GW-W13-2	11/11/90	5.0	H90-11.63	ug/L		100	100
GW-W15-1	06/25/90	5.0	H90-06.155	ug/L		2000	2000
GW-W93-1	06/25/90	5.0	H90-06.155	ug/L	Field Duplicate of GW-W15-1	1000	1000
GW-W15-2	11/11/90	5.0	H90-11.63	ug/L		20	20
GW-GW6-2	11/07/90	1.0	H90-11.46	ug/L		10	10
GW-GW15-2	11/08/90	1.0	H90-11.46	ug/L		10	10
GW-GW17-2	11/08/90	1.0	H90-11.46	ug/L		10	10
GW-W92-1	06/22/90	1.0	H90-06.155	ug/L	Field Blank		
GW-M32-1	06/22/90	1.0	H90-06.155	ug/L	Trip Blank		
GW-M33-1	06/25/90	1.0	H90-06.155	ug/L	Rinsate Blank	10	10
GW-M34-1	06/25/90	1.0	H90-06.155	ug/L	Trip Blank		
GW-M31-2	11/08/90	1.0	H90-11.46	ug/L	Trip Blank		
GW-M32-2	11/09/90	1.0	H90-11.46	ug/L	Trip Blank		
GW-M33-2	11/12/90	1.0	H90-11.63	ug/L	Trip Blank		
GW-R11-2	11/08/90	1.0	H90-11.46	ug/L	Rinsate Blank	10	10
GW-W8Q-2	11/12/90	1.0	H90-11.63	ug/L	Field Blank		
GW-GWP-2	11/14/90	1.0	H90-11.76	ug/L	PE Sample	10	10
SW-100-01	07/12/90	1.0	H90-07.53	ug/L	Aqueous Bottle Blank	10	10

CLP ORGANICS
IN GROUND WATER

LOCATION/WELL	DATE SAMPLED	DILUTION	WORK ORDER	UNITS		N-Nitroso-Di-n-Propylamine	Hexachloroethane	Nitrobenzene
GW-W04-1	06/25/90	5.0	H90-06.155	ug/L		3500	3500	3500
GW-W4-2	11/11/90	5.0	H90-11.63	ug/L		500	500	500
GW-W9Q-2	11/11/90	25	H90-11.63	ug/L	Field Duplicate of GW-W4-2	500	500	500
GW-W05-1	06/22/90	5.0	H90-06.155	ug/L		500	500	500
GW-W05-1	NA	--	H90-06.155	ug/L		200	200	200
GW-W5-2	11/11/90	5.0	H90-11.63	ug/L		100	100	100
GW-W08-1	06/25/90	20	H90-06.155	ug/L		200	200	200
GW-W8-2	11/11/90	25	H90-11.63	ug/L		500	500	500
GW-W13-1	06/25/90	5.0	H90-06.155	ug/L		500	500	500
GW-W13-2	11/11/90	5.0	H90-11.63	ug/L		100	100	100
GW-W15-1	06/25/90	5.0	H90-06.155	ug/L		2000	2000	2000
GW-W93-1	06/25/90	5.0	H90-06.155	ug/L	Field Duplicate of GW-W15-1	1000	1000	1000
GW-W15-2	11/11/90	5.0	H90-11.63	ug/L		20	20	20
GW-GW6-2	11/07/90	1.0	H90-11.46	ug/L		10	10	10
GW-GW15-2	11/08/90	1.0	H90-11.46	ug/L		10	10	10
GW-GW17-2	11/08/90	1.0	H90-11.46	ug/L		10	10	10
GW-W92-1	06/22/90	1.0	H90-06.155	ug/L	Field Blank			
GW-M32-1	06/22/90	1.0	H90-06.155	ug/L	Trip Blank			
GW-M33-1	06/25/90	1.0	H90-06.155	ug/L	Rinsate Blank	10	10	10
GW-M34-1	06/25/90	1.0	H90-06.155	ug/L	Trip Blank			
GW-M31-2	11/08/90	1.0	H90-11.46	ug/L	Trip Blank			
GW-M32-2	11/09/90	1.0	H90-11.46	ug/L	Trip Blank			
GW-M33-2	11/12/90	1.0	H90-11.63	ug/L	Trip Blank			
GW-R11-2	11/08/90	1.0	H90-11.46	ug/L	Rinsate Blank	10	10	10
GW-W8Q-2	11/12/90	1.0	H90-11.63	ug/L	Field Blank			
GW-GWP-2	11/14/90	1.0	H90-11.76	ug/L	PE Sample	10	3	10
SW-100-01	07/12/90	1.0	H90-07.53	ug/L	Aqueous Bottle Blank	10	10	10

CLP ORGANICS
IN GROUND WATER

LOCATION/WELL	DATE SAMPLED	DILUTION	WORK ORDER	UNITS		Isophorone	2-Nitrophenol	2,4-Dimethylphenol	Benzoic Acid
GW-W04-1	06/25/90	5.0	H90-06.155	ug/L		3500	3500	3500	18000
GW-W4-2	11/11/90	5.0	H90-11.63	ug/L		500	500	500	2500
GW-W9Q-2	11/11/90	25	H90-11.63	ug/L	Field Duplicate of GW-W4-2	500	500	500	2500
GW-W05-1	06/22/90	5.0	H90-06.155	ug/L		500	500	500	2500
GW-W05-1	NA	--	H90-06.155	ug/L		200	200	200	1000
GW-W5-2	11/11/90	5.0	H90-11.63	ug/L		100	100	100	500
GW-W08-1	06/25/90	20	H90-06.155	ug/L		200	200	200	1000
GW-W8-2	11/11/90	25	H90-11.63	ug/L		500	500	500	2500
GW-W13-1	06/25/90	5.0	H90-06.155	ug/L		500	500	500	2500
GW-W13-2	11/11/90	5.0	H90-11.63	ug/L		100	100	100	500
GW-W15-1	06/25/90	5.0	H90-06.155	ug/L		2000	2000	2000	10000
GW-W93-1	06/25/90	5.0	H90-06.155	ug/L	Field Duplicate of GW-W15-1	1000	1000	1000	5000
GW-W15-2	11/11/90	5.0	H90-11.63	ug/L		20	20	20	100
GW-GW6-2	11/07/90	1.0	H90-11.46	ug/L		10	10	10	50
GW-GW15-2	11/08/90	1.0	H90-11.46	ug/L		10	10	10	50
GW-GW17-2	11/08/90	1.0	H90-11.46	ug/L		10	10	10	50
GW-W92-1	06/22/90	1.0	H90-06.155	ug/L	Field Blank				
GW-M32-1	06/22/90	1.0	H90-06.155	ug/L	Trip Blank				
GW-M33-1	06/25/90	1.0	H90-06.155	ug/L	Rinsate Blank	10	10	10	50
GW-M34-1	06/25/90	1.0	H90-06.155	ug/L	Trip Blank				
GW-M31-2	11/08/90	1.0	H90-11.46	ug/L	Trip Blank				
GW-M32-2	11/09/90	1.0	H90-11.46	ug/L	Trip Blank				
GW-M33-2	11/12/90	1.0	H90-11.63	ug/L	Trip Blank				
GW-R11-2	11/08/90	1.0	H90-11.46	ug/L	Rinsate Blank	10	10	10	50
GW-W8Q-2	11/12/90	1.0	H90-11.63	ug/L	Field Blank				
GW-GWP-2	11/14/90	1.0	H90-11.76	ug/L	PE Sample	7	10	10	5
SW-100-01	07/12/90	1.0	H90-07.53	ug/L	Aqueous Bottle Blank	10	10	10	50

CLP ORGANICS
IN GROUND WATER

LOCATION/WELL	DATE SAMPLED	DILUTION	WORK ORDER	UNITS		bis(2-Chloroethoxy)Methane	2,4-Dichlorophenol
GW-W04-1	06/25/90	5.0	H90-06.155	ug/L		3500	3500
GW-W4-2	11/11/90	5.0	H90-11.63	ug/L		500	500
GW-W9Q-2	11/11/90	25	H90-11.63	ug/L	Field Duplicate of GW-W4-2	500	500
GW-W05-1	06/22/90	5.0	H90-06.155	ug/L		500	500
GW-W05-1	NA	--	H90-06.155	ug/L		200	200
GW-W5-2	11/11/90	5.0	H90-11.63	ug/L		100	100
GW-W08-1	06/25/90	20	H90-06.155	ug/L		200	200
GW-W8-2	11/11/90	25	H90-11.63	ug/L		500	500
GW-W13-1	06/25/90	5.0	H90-06.155	ug/L		500	500
GW-W13-2	11/11/90	5.0	H90-11.63	ug/L		100	100
GW-W15-1	06/25/90	5.0	H90-06.155	ug/L		2000	2000
GW-W93-1	06/25/90	5.0	H90-06.155	ug/L	Field Duplicate of GW-W15-1	1000	1000
GW-W15-2	11/11/90	5.0	H90-11.63	ug/L		20	20
GW-GW6-2	11/07/90	1.0	H90-11.46	ug/L		10	10
GW-GW15-2	11/08/90	1.0	H90-11.46	ug/L		10	10
GW-GW17-2	11/08/90	1.0	H90-11.46	ug/L		10	10
GW-W92-1	06/22/90	1.0	H90-06.155	ug/L	Field Blank		
GW-M32-1	06/22/90	1.0	H90-06.155	ug/L	Trip Blank		
GW-M33-1	06/25/90	1.0	H90-06.155	ug/L	Rinsate Blank	10	10
GW-M34-1	06/25/90	1.0	H90-06.155	ug/L	Trip Blank		
GW-M31-2	11/08/90	1.0	H90-11.46	ug/L	Trip Blank		
GW-M32-2	11/09/90	1.0	H90-11.46	ug/L	Trip Blank		
GW-M33-2	11/12/90	1.0	H90-11.63	ug/L	Trip Blank		
GW-R11-2	11/08/90	1.0	H90-11.46	ug/L	Rinsate Blank	10	10
GW-W8Q-2	11/12/90	1.0	H90-11.63	ug/L	Field Blank		
GW-GWP-2	11/14/90	1.0	H90-11.76	ug/L	PE Sample	10	10
SW-100-01	07/12/90	1.0	H90-07.53	ug/L	Aqueous Bottle Blank	10	10

CLP ORGANICS
IN GROUND WATER

LOCATION/WELL	DATE SAMPLED	DILUTION	WORK ORDER	UNITS		1,2,4-Trichlorobenzene	Naphthalene	4-Chloroaniline
GW-W04-1	06/25/90	5.0	H90-06.155	ug/L		3500	1100	3500
GW-W4-2	11/11/90	5.0	H90-11.63	ug/L		500	500	500
GW-W9Q-2	11/11/90	25	H90-11.63	ug/L	Field Duplicate of GW-W4-2	500	500	500
GW-W05-1	06/22/90	5.0	H90-06.155	ug/L		500	720	500
GW-W05-1	NA	--	H90-06.155	ug/L		200	83	200
GW-W5-2	11/11/90	5.0	H90-11.63	ug/L		100	100	100
GW-W08-1	06/25/90	20	H90-06.155	ug/L		200	200	200
GW-W8-2	11/11/90	25	H90-11.63	ug/L		500	820	500
GW-W13-1	06/25/90	5.0	H90-06.155	ug/L		500	700	500
GW-W13-2	11/11/90	5.0	H90-11.63	ug/L		100	120	100
GW-W15-1	06/25/90	5.0	H90-06.155	ug/L		2000	980	2000
GW-W93-1	06/25/90	5.0	H90-06.155	ug/L	Field Duplicate of GW-W15-1	1000	470	1000
GW-W15-2	11/11/90	5.0	H90-11.63	ug/L		20	270	20
GW-GW6-2	11/07/90	1.0	H90-11.46	ug/L		10	10	10
GW-GW15-2	11/08/90	1.0	H90-11.46	ug/L		10	10	10
GW-GW17-2	11/08/90	1.0	H90-11.46	ug/L		10	10	10
GW-W92-1	06/22/90	1.0	H90-06.155	ug/L	Field Blank			
GW-M32-1	06/22/90	1.0	H90-06.155	ug/L	Trip Blank			
GW-M33-1	06/25/90	1.0	H90-06.155	ug/L	Rinsate Blank	10	10	10
GW-M34-1	06/25/90	1.0	H90-06.155	ug/L	Trip Blank			
GW-M31-2	11/08/90	1.0	H90-11.46	ug/L	Trip Blank			
GW-M32-2	11/09/90	1.0	H90-11.46	ug/L	Trip Blank			
GW-M33-2	11/12/90	1.0	H90-11.63	ug/L	Trip Blank			
GW-R11-2	11/08/90	1.0	H90-11.46	ug/L	Rinsate Blank	10	10	10
GW-W8Q-2	11/12/90	1.0	H90-11.63	ug/L	Field Blank			
GW-GWP-2	11/14/90	1.0	H90-11.76	ug/L	PE Sample	7	11	2
SW-100-01	07/12/90	1.0	H90-07.53	ug/L	Aqueous Bottle Blank	10	10	10

CLP ORGANICS
IN GROUND WATER

LOCATION/WELL	DATE SAMPLED	DILUTION	WORK ORDER	UNITS		Hexachlorobutadiene	4-Chloro-3-Methylphenol
GW-W04-1	06/25/90	5.0	H90-06.155	ug/L		3500	3500
GW-W4-2	11/11/90	5.0	H90-11.63	ug/L		500	500
GW-W9Q-2	11/11/90	25	H90-11.63	ug/L	Field Duplicate of GW-W4-2	500	500
GW-W05-1	06/22/90	5.0	H90-06.155	ug/L		500	500
GW-W05-1	NA	--	H90-06.155	ug/L		200	200
GW-W5-2	11/11/90	5.0	H90-11.63	ug/L		100	100
GW-W08-1	06/25/90	20	H90-06.155	ug/L		200	200
GW-W8-2	11/11/90	25	H90-11.63	ug/L		500	500
GW-W13-1	06/25/90	5.0	H90-06.155	ug/L		500	500
GW-W13-2	11/11/90	5.0	H90-11.63	ug/L		100	100
GW-W15-1	06/25/90	5.0	H90-06.155	ug/L		2000	2000
GW-W93-1	06/25/90	5.0	H90-06.155	ug/L	Field Duplicate of GW-W15-1	1000	1000
GW-W15-2	11/11/90	5.0	H90-11.63	ug/L		20	20
GW-GW6-2	11/07/90	1.0	H90-11.46	ug/L		10	10
GW-GW15-2	11/08/90	1.0	H90-11.46	ug/L		10	10
GW-GW17-2	11/08/90	1.0	H90-11.46	ug/L		10	10
GW-W92-1	06/22/90	1.0	H90-06.155	ug/L	Field Blank		
GW-M32-1	06/22/90	1.0	H90-06.155	ug/L	Trip Blank		
GW-M33-1	06/25/90	1.0	H90-06.155	ug/L	Rinsate Blank	10	10
GW-M34-1	06/25/90	1.0	H90-06.155	ug/L	Trip Blank		
GW-M31-2	11/08/90	1.0	H90-11.46	ug/L	Trip Blank		
GW-M32-2	11/09/90	1.0	H90-11.46	ug/L	Trip Blank		
GW-M33-2	11/12/90	1.0	H90-11.63	ug/L	Trip Blank		
GW-R11-2	11/08/90	1.0	H90-11.46	ug/L	Rinsate Blank	10	10
GW-W8Q-2	11/12/90	1.0	H90-11.63	ug/L	Field Blank		
GW-GWP-2	11/14/90	1.0	H90-11.76	ug/L	PE Sample	10	9
SW-100-01	07/12/90	1.0	H90-07.53	ug/L	Aqueous Bottle Blank	10	10

CLP ORGANICS
IN GROUND WATER

LOCATION/WELL	DATE SAMPLED	DILUTION	WORK ORDER	UNITS		2-Methylnaphthalene	Hexachlorocyclopentadiene
GW-W04-1	06/25/90	5.0	H90-06.155	ug/L		15000	3500
GW-W4-2	11/11/90	5.0	H90-11.63	ug/L		160	500
GW-W9Q-2	11/11/90	25	H90-11.63	ug/L	Field Duplicate of GW-W4-2	220	500
GW-W05-1	06/22/90	5.0	H90-06.155	ug/L		2900	500
GW-W05-1	NA	--	H90-06.155	ug/L		14000	200
GW-W5-2	11/11/90	5.0	H90-11.63	ug/L		83	100
GW-W08-1	06/25/90	20	H90-06.155	ug/L		63	200
GW-W8-2	11/11/90	25	H90-11.63	ug/L		2300	500
GW-W13-1	06/25/90	5.0	H90-06.155	ug/L		6400	500
GW-W13-2	11/11/90	5.0	H90-11.63	ug/L		700	100
GW-W15-1	06/25/90	5.0	H90-06.155	ug/L		5400	2000
GW-W93-1	06/25/90	5.0	H90-06.155	ug/L	Field Duplicate of GW-W15-1	2700	1000
GW-W15-2	11/11/90	5.0	H90-11.63	ug/L		890	20
GW-GW6-2	11/07/90	1.0	H90-11.46	ug/L		10	10
GW-GW15-2	11/08/90	1.0	H90-11.46	ug/L		10	10
GW-GW17-2	11/08/90	1.0	H90-11.46	ug/L		10	10
GW-W92-1	06/22/90	1.0	H90-06.155	ug/L	Field Blank		
GW-M32-1	06/22/90	1.0	H90-06.155	ug/L	Trip Blank		
GW-M33-1	06/25/90	1.0	H90-06.155	ug/L	Rinsate Blank	10	10
GW-M34-1	06/25/90	1.0	H90-06.155	ug/L	Trip Blank		
GW-M31-2	11/08/90	1.0	H90-11.46	ug/L	Trip Blank		
GW-M32-2	11/09/90	1.0	H90-11.46	ug/L	Trip Blank		
GW-M33-2	11/12/90	1.0	H90-11.63	ug/L	Trip Blank		
GW-R11-2	11/08/90	1.0	H90-11.46	ug/L	Rinsate Blank	10	10
GW-W8Q-2	11/12/90	1.0	H90-11.63	ug/L	Field Blank		
GW-GWP-2	11/14/90	1.0	H90-11.76	ug/L	PE Sample	13	10
SW-100-01	07/12/90	1.0	H90-07.53	ug/L	Aqueous Bottle Blank	10	10

CLP ORGANICS
IN GROUND WATER

LOCATION/WELL	DATE SAMPLED	DILUTION	WORK ORDER	UNITS		2,4,6-Trichlorophenol	2,4,5-Trichlorophenol
GW-W04-1	06/25/90	5.0	H90-06.155	ug/L		3500	18000
GW-W4-2	11/11/90	5.0	H90-11.63	ug/L		500	2500
GW-W9Q-2	11/11/90	25	H90-11.63	ug/L	Field Duplicate of GW-W4-2	500	2500
GW-W05-1	06/22/90	5.0	H90-06.155	ug/L		500	2500
GW-W05-1	NA	--	H90-06.155	ug/L		200	1000
GW-W5-2	11/11/90	5.0	H90-11.63	ug/L		100	500
GW-W08-1	06/25/90	20	H90-06.155	ug/L		200	1000
GW-W8-2	11/11/90	25	H90-11.63	ug/L		500	2500
GW-W13-1	06/25/90	5.0	H90-06.155	ug/L		500	2500
GW-W13-2	11/11/90	5.0	H90-11.63	ug/L		100	500
GW-W15-1	06/25/90	5.0	H90-06.155	ug/L		2000	10000
GW-W93-1	06/25/90	5.0	H90-06.155	ug/L	Field Duplicate of GW-W15-1	1000	5000
GW-W15-2	11/11/90	5.0	H90-11.63	ug/L		20	100
GW-GW6-2	11/07/90	1.0	H90-11.46	ug/L		10	50
GW-GW15-2	11/08/90	1.0	H90-11.46	ug/L		10	50
GW-GW17-2	11/08/90	1.0	H90-11.46	ug/L		10	50
GW-W92-1	06/22/90	1.0	H90-06.155	ug/L	Field Blank		
GW-M32-1	06/22/90	1.0	H90-06.155	ug/L	Trip Blank		
GW-M33-1	06/25/90	1.0	H90-06.155	ug/L	Rinsate Blank	10	50
GW-M34-1	06/25/90	1.0	H90-06.155	ug/L	Trip Blank		
GW-M31-2	11/08/90	1.0	H90-11.46	ug/L	Trip Blank		
GW-M32-2	11/09/90	1.0	H90-11.46	ug/L	Trip Blank		
GW-M33-2	11/12/90	1.0	H90-11.63	ug/L	Trip Blank		
GW-R11-2	11/08/90	1.0	H90-11.46	ug/L	Rinsate Blank	10	50
GW-W8Q-2	11/12/90	1.0	H90-11.63	ug/L	Field Blank		
GW-GWP-2	11/14/90	1.0	H90-11.76	ug/L	PE Sample	8	50
SW-100-01	07/12/90	1.0	H90-07.53	ug/L	Aqueous Bottle Blank	10	50

CLP ORGANICS
IN GROUND WATER

LOCATION/WELL	DATE SAMPLED	DILUTION	WORK ORDER	UNITS		2-Chloronaphthalene	2-Nitroaniline	Dimethyl Phthalate
GW-W04-1	06/25/90	5.0	H90-06.155	ug/L		3500	18000	3500
GW-W4-2	11/11/90	5.0	H90-11.63	ug/L		500	2500	500
GW-W9Q-2	11/11/90	25	H90-11.63	ug/L	Field Duplicate of GW-W4-2	500	2500	500
GW-W05-1	06/22/90	5.0	H90-06.155	ug/L		500	2500	500
GW-W05-1	NA	--	H90-06.155	ug/L		280	980	200
GW-W5-2	11/11/90	5.0	H90-11.63	ug/L		100	500	100
GW-W08-1	06/25/90	20	H90-06.155	ug/L		200	1000	200
GW-W8-2	11/11/90	25	H90-11.63	ug/L		500	2500	500
GW-W13-1	06/25/90	5.0	H90-06.155	ug/L		500	2500	500
GW-W13-2	11/11/90	5.0	H90-11.63	ug/L		100	500	100
GW-W15-1	06/25/90	5.0	H90-06.155	ug/L		2000	10000	2000
GW-W93-1	06/25/90	5.0	H90-06.155	ug/L	Field Duplicate of GW-W15-1	1000	5000	1000
GW-W15-2	11/11/90	5.0	H90-11.63	ug/L		20	100	20
GW-GW6-2	11/07/90	1.0	H90-11.46	ug/L		10	50	10
GW-GW15-2	11/08/90	1.0	H90-11.46	ug/L		10	50	10
GW-GW17-2	11/08/90	1.0	H90-11.46	ug/L		10	50	10
GW-W92-1	06/22/90	1.0	H90-06.155	ug/L	Field Blank			
GW-M32-1	06/22/90	1.0	H90-06.155	ug/L	Trip Blank			
GW-M33-1	06/25/90	1.0	H90-06.155	ug/L	Rinsate Blank	10	50	10
GW-M34-1	06/25/90	1.0	H90-06.155	ug/L	Trip Blank			
GW-M31-2	11/08/90	1.0	H90-11.46	ug/L	Trip Blank			
GW-M32-2	11/09/90	1.0	H90-11.46	ug/L	Trip Blank			
GW-M33-2	11/12/90	1.0	H90-11.63	ug/L	Trip Blank			
GW-R11-2	11/08/90	1.0	H90-11.46	ug/L	Rinsate Blank	10	50	10
GW-W8Q-2	11/12/90	1.0	H90-11.63	ug/L	Field Blank			
GW-GWP-2	11/14/90	1.0	H90-11.76	ug/L	PE Sample	10	50	10
SW-100-01	07/12/90	1.0	H90-07.53	ug/L	Aqueous Bottle Blank	10	50	10

CLP ORGANICS
IN GROUND WATER

LOCATION/WELL	DATE SAMPLED	DILUTION	WORK ORDER	UNITS		Acenaphthylene	2-6-Dinitrotoluene	3-Nitroaniline
GW-W04-1	06/25/90	5.0	H90-06.155	ug/L		3500	3500	18000
GW-W4-2	11/11/90	5.0	H90-11.63	ug/L		500	500	2500
GW-W9Q-2	11/11/90	25	H90-11.63	ug/L	Field Duplicate of GW-W4-2	500	500	2500
GW-W05-1	06/22/90	5.0	H90-06.155	ug/L		500	500	2500
GW-W05-1	NA	--	H90-06.155	ug/L		190	200	1000
GW-W5-2	11/11/90	5.0	H90-11.63	ug/L		100	100	500
GW-W08-1	06/25/90	20	H90-06.155	ug/L		200	200	1000
GW-W8-2	11/11/90	25	H90-11.63	ug/L		500	500	2500
GW-W13-1	06/25/90	5.0	H90-06.155	ug/L		500	500	2500
GW-W13-2	11/11/90	5.0	H90-11.63	ug/L		100	100	500
GW-W15-1	06/25/90	5.0	H90-06.155	ug/L		2000	2000	10000
GW-W93-1	06/25/90	5.0	H90-06.155	ug/L	Field Duplicate of GW-W15-1	1000	1000	5000
GW-W15-2	11/11/90	5.0	H90-11.63	ug/L		20	20	100
GW-GW6-2	11/07/90	1.0	H90-11.46	ug/L		10	10	50
GW-GW15-2	11/08/90	1.0	H90-11.46	ug/L		10	10	50
GW-GW17-2	11/08/90	1.0	H90-11.46	ug/L		10	10	50
GW-W92-1	06/22/90	1.0	H90-06.155	ug/L	Field Blank			
GW-M32-1	06/22/90	1.0	H90-06.155	ug/L	Trip Blank			
GW-M33-1	06/25/90	1.0	H90-06.155	ug/L	Rinsate Blank	10	10	50
GW-M34-1	06/25/90	1.0	H90-06.155	ug/L	Trip Blank			
GW-M31-2	11/08/90	1.0	H90-11.46	ug/L	Trip Blank			
GW-M32-2	11/09/90	1.0	H90-11.46	ug/L	Trip Blank			
GW-M33-2	11/12/90	1.0	H90-11.63	ug/L	Trip Blank			
GW-R11-2	11/08/90	1.0	H90-11.46	ug/L	Rinsate Blank	10	10	50
GW-W8Q-2	11/12/90	1.0	H90-11.63	ug/L	Field Blank			
GW-GWP-2	11/14/90	1.0	H90-11.76	ug/L	PE Sample	10	10	50
SW-100-01	07/12/90	1.0	H90-07.53	ug/L	Aqueous Bottle Blank	10	10	50

CLP ORGANICS
IN GROUND WATER

LOCATION/WELL	DATE SAMPLED	DILUTION	WORK ORDER	UNITS		Acenaphthene	2,4-Dinitrophenol	4-Nitrophenol	Dibenzofuran
GW-W04-1	06/25/90	5.0	H90-06.155	ug/L		4200	18000	18000	3500
GW-W4-2	11/11/90	5.0	H90-11.63	ug/L		500	2500	2500	500
GW-W9Q-2	11/11/90	25	H90-11.63	ug/L	Field Duplicate of GW-W4-2	500	2500	2500	500
GW-W05-1	06/22/90	5.0	H90-06.155	ug/L		220	2500	2500	140
GW-W05-1	NA	--	H90-06.155	ug/L		1200	1000	1000	830
GW-W5-2	11/11/90	5.0	H90-11.63	ug/L		30	500	500	17
GW-W08-1	06/25/90	20	H90-06.155	ug/L		200	1000	1000	200
GW-W8-2	11/11/90	25	H90-11.63	ug/L		500	2500	2500	500
GW-W13-1	06/25/90	5.0	H90-06.155	ug/L		480	2500	2500	500
GW-W13-2	11/11/90	5.0	H90-11.63	ug/L		25	500	500	17
GW-W15-1	06/25/90	5.0	H90-06.155	ug/L		320	10000	10000	2000
GW-W93-1	06/25/90	5.0	H90-06.155	ug/L	Field Duplicate of GW-W15-1	170	5000	5000	1000
GW-W15-2	11/11/90	5.0	H90-11.63	ug/L		22	100	100	21
GW-GW6-2	11/07/90	1.0	H90-11.46	ug/L		10	50	50	10
GW-GW15-2	11/08/90	1.0	H90-11.46	ug/L		10	50	50	10
GW-GW17-2	11/08/90	1.0	H90-11.46	ug/L		10	50	50	10
GW-W92-1	06/22/90	1.0	H90-06.155	ug/L	Field Blank				
GW-M32-1	06/22/90	1.0	H90-06.155	ug/L	Trip Blank				
GW-M33-1	06/25/90	1.0	H90-06.155	ug/L	Rinsate Blank	10	50	50	10
GW-M34-1	06/25/90	1.0	H90-06.155	ug/L	Trip Blank				
GW-M31-2	11/08/90	1.0	H90-11.46	ug/L	Trip Blank				
GW-M32-2	11/09/90	1.0	H90-11.46	ug/L	Trip Blank				
GW-M33-2	11/12/90	1.0	H90-11.63	ug/L	Trip Blank				
GW-R11-2	11/08/90	1.0	H90-11.46	ug/L	Rinsate Blank	10	50	50	10
GW-W8Q-2	11/12/90	1.0	H90-11.63	ug/L	Field Blank				
GW-GWP-2	11/14/90	1.0	H90-11.76	ug/L	PE Sample	10	50	50	6
SW-100-01	07/12/90	1.0	H90-07.53	ug/L	Aqueous Bottle Blank	10	50	50	10

CLP ORGANICS
IN GROUND WATER

LOCATION/WELL	DATE SAMPLED	DILUTION	WORK ORDER	UNITS		2,4-Dinitrotoluene	Diethylphthalate	4-Chlorophenyl-phenylether
GW-W04-1	06/25/90	5.0	H90-06.155	ug/L		3500	3500	3500
GW-W4-2	11/11/90	5.0	H90-11.63	ug/L		500	500	500
GW-W9Q-2	11/11/90	25	H90-11.63	ug/L	Field Duplicate of GW-W4-2	500	500	500
GW-W05-1	06/22/90	5.0	H90-06.155	ug/L		500	500	500
GW-W05-1	NA	--	H90-06.155	ug/L		280	200	200
GW-W5-2	11/11/90	5.0	H90-11.63	ug/L		100	100	100
GW-W08-1	06/25/90	20	H90-06.155	ug/L		200	200	200
GW-W8-2	11/11/90	25	H90-11.63	ug/L		500	500	500
GW-W13-1	06/25/90	5.0	H90-06.155	ug/L		500	500	500
GW-W13-2	11/11/90	5.0	H90-11.63	ug/L		100	100	100
GW-W15-1	06/25/90	5.0	H90-06.155	ug/L		2000	2000	2000
GW-W93-1	06/25/90	5.0	H90-06.155	ug/L	Field Duplicate of GW-W15-1	1000	1000	1000
GW-W15-2	11/11/90	5.0	H90-11.63	ug/L		20	20	20
GW-GW6-2	11/07/90	1.0	H90-11.46	ug/L		10	10	10
GW-GW15-2	11/08/90	1.0	H90-11.46	ug/L		10	10	10
GW-GW17-2	11/08/90	1.0	H90-11.46	ug/L		10	10	10
GW-W92-1	06/22/90	1.0	H90-06.155	ug/L	Field Blank			
GW-M32-1	06/22/90	1.0	H90-06.155	ug/L	Trip Blank			
GW-M33-1	06/25/90	1.0	H90-06.155	ug/L	Rinsate Blank	10	10	10
GW-M34-1	06/25/90	1.0	H90-06.155	ug/L	Trip Blank			
GW-M31-2	11/08/90	1.0	H90-11.46	ug/L	Trip Blank			
GW-M32-2	11/09/90	1.0	H90-11.46	ug/L	Trip Blank			
GW-M33-2	11/12/90	1.0	H90-11.63	ug/L	Trip Blank			
GW-R11-2	11/08/90	1.0	H90-11.46	ug/L	Rinsate Blank	10	10	10
GW-W8Q-2	11/12/90	1.0	H90-11.63	ug/L	Field Blank			
GW-GWP-2	11/14/90	1.0	H90-11.76	ug/L	PE Sample	6	10	10
SW-100-01	07/12/90	1.0	H90-07.53	ug/L	Aqueous Bottle Blank	10	3	10

CLP ORGANICS
IN GROUND WATER

LOCATION/WELL	DATE SAMPLED	DILUTION	WORK ORDER	UNITS		Fluorene	4-Nitroaniline	4,6-Dinitro-2-Methylphenol
GW-W04-1	06/25/90	5.0	H90-06.155	ug/L		4700	18000	18000
GW-W4-2	11/11/90	5.0	H90-11.63	ug/L		500	2500	2500
GW-W9Q-2	11/11/90	25	H90-11.63	ug/L	Field Duplicate of GW-W4-2	500	2500	2500
GW-W05-1	06/22/90	5.0	H90-06.155	ug/L		190	2500	2500
GW-W05-1	NA	--	H90-06.155	ug/L		1200	1000	1000
GW-W5-2	11/11/90	5.0	H90-11.63	ug/L		24	500	500
GW-W08-1	06/25/90	20	H90-06.155	ug/L		200	1000	1000
GW-W8-2	11/11/90	25	H90-11.63	ug/L		500	2500	2500
GW-W13-1	06/25/90	5.0	H90-06.155	ug/L		640	2500	2500
GW-W13-2	11/11/90	5.0	H90-11.63	ug/L		23	500	500
GW-W15-1	06/25/90	5.0	H90-06.155	ug/L		400	10000	10000
GW-W93-1	06/25/90	5.0	H90-06.155	ug/L	Field Duplicate of GW-W15-1	220	5000	5000
GW-W15-2	11/11/90	5.0	H90-11.63	ug/L		20	100	100
GW-GW6-2	11/07/90	1.0	H90-11.46	ug/L		10	50	50
GW-GW15-2	11/08/90	1.0	H90-11.46	ug/L		10	50	50
GW-GW17-2	11/08/90	1.0	H90-11.46	ug/L		10	50	50
GW-W92-1	06/22/90	1.0	H90-06.155	ug/L	Field Blank			
GW-M32-1	06/22/90	1.0	H90-06.155	ug/L	Trip Blank			
GW-M33-1	06/25/90	1.0	H90-06.155	ug/L	Rinsate Blank	10	50	50
GW-M34-1	06/25/90	1.0	H90-06.155	ug/L	Trip Blank			
GW-M31-2	11/08/90	1.0	H90-11.46	ug/L	Trip Blank			
GW-M32-2	11/09/90	1.0	H90-11.46	ug/L	Trip Blank			
GW-M33-2	11/12/90	1.0	H90-11.63	ug/L	Trip Blank			
GW-R11-2	11/08/90	1.0	H90-11.46	ug/L	Rinsate Blank	10	50	50
GW-W8Q-2	11/12/90	1.0	H90-11.63	ug/L	Field Blank			
GW-GWP-2	11/14/90	1.0	H90-11.76	ug/L	PE Sample	10	50	50
SW-100-01	07/12/90	1.0	H90-07.53	ug/L	Aqueous Bottle Blank	10	50	50

CLP ORGANICS
IN GROUND WATER

LOCATION/WELL	DATE SAMPLED	DILUTION	WORK ORDER	UNITS		N-Nitrosodiphenylamine	4-Bromophenyl-phenylether
GW-W04-1	06/25/90	5.0	H90-06.155	ug/L		3500	3500
GW-W4-2	11/11/90	5.0	H90-11.63	ug/L		500	500
GW-W9Q-2	11/11/90	25	H90-11.63	ug/L	Field Duplicate of GW-W4-2	500	500
GW-W05-1	06/22/90	5.0	H90-06.155	ug/L		500	500
GW-W05-1	NA	--	H90-06.155	ug/L		200	200
GW-W5-2	11/11/90	5.0	H90-11.63	ug/L		100	100
GW-W08-1	06/25/90	20	H90-06.155	ug/L		200	200
GW-W8-2	11/11/90	25	H90-11.63	ug/L		500	500
GW-W13-1	06/25/90	5.0	H90-06.155	ug/L		500	500
GW-W13-2	11/11/90	5.0	H90-11.63	ug/L		100	100
GW-W15-1	06/25/90	5.0	H90-06.155	ug/L		2000	2000
GW-W93-1	06/25/90	5.0	H90-06.155	ug/L	Field Duplicate of GW-W15-1	1000	1000
GW-W15-2	11/11/90	5.0	H90-11.63	ug/L		20	20
GW-GW6-2	11/07/90	1.0	H90-11.46	ug/L		10	10
GW-GW15-2	11/08/90	1.0	H90-11.46	ug/L		10	10
GW-GW17-2	11/08/90	1.0	H90-11.46	ug/L		10	10
GW-W92-1	06/22/90	1.0	H90-06.155	ug/L	Field Blank		
GW-M32-1	06/22/90	1.0	H90-06.155	ug/L	Trip Blank		
GW-M33-1	06/25/90	1.0	H90-06.155	ug/L	Rinsate Blank	10	10
GW-M34-1	06/25/90	1.0	H90-06.155	ug/L	Trip Blank		
GW-M31-2	11/08/90	1.0	H90-11.46	ug/L	Trip Blank		
GW-M32-2	11/09/90	1.0	H90-11.46	ug/L	Trip Blank		
GW-M33-2	11/12/90	1.0	H90-11.63	ug/L	Trip Blank		
GW-R11-2	11/08/90	1.0	H90-11.46	ug/L	Rinsate Blank	10	10
GW-W8Q-2	11/12/90	1.0	H90-11.63	ug/L	Field Blank		
GW-GWP-2	11/14/90	1.0	H90-11.76	ug/L	PE Sample	10	10
SW-100-01	07/12/90	1.0	H90-07.53	ug/L	Aqueous Bottle Blank	10	10

APPENDIX III

MOBILITY OF PENTACHLOROPHENOL
AT THE MONTANA POLE NPL SITE
BUTTE, MONTANA

MOBILITY OF PENTACHLOROPHENOL AT THE MONTANA POLE NPL SITE, BUTTE, MONTANA

Darrel M. Stordahl
Montana Bureau of Mines and Geology

April, 1993

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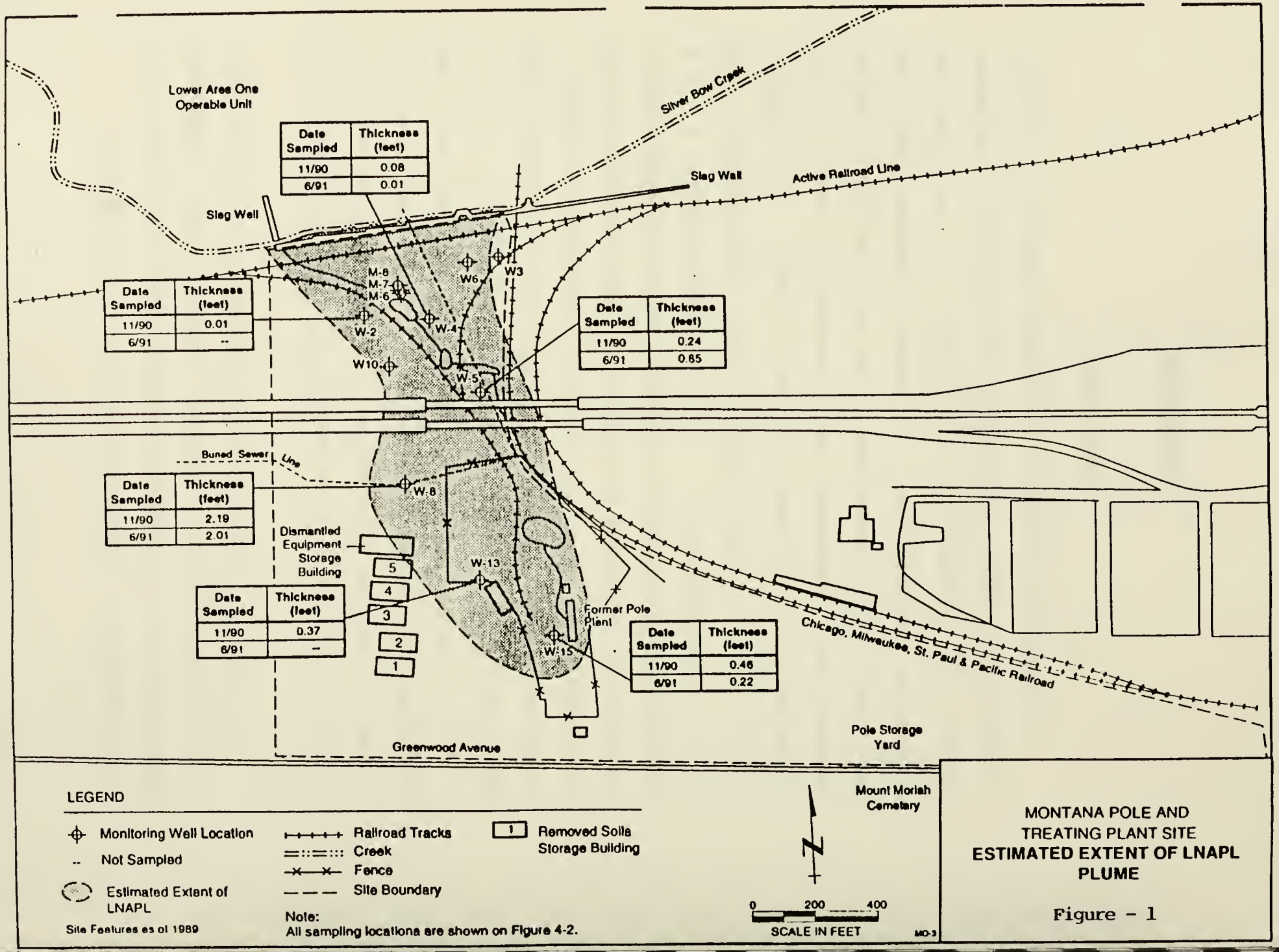
INTRODUCTION

Site History

The Montana Pole Plant is Currently listed as a National Priority List (NPL) Comprehensive Environmental Response, Compensation, and Liability Act (CERLCA) site due to soil and groundwater contamination with pentachlorophenol (PCP) from past wood treating operations. The PCP/Diesel fuel mixture (product) is a discarded wood preservative that contains approximately 95 % diesel fuel and 5 % PCP. The technical grade PCP used in wood treating is not a pure material, but rather is a mixture of 85 - 90 % pentachlorophenol, 4 - 8 % tetrachlorophenol, and the remaining material consisting of higher molecular weight phenols as well as a neutral fraction that contains dioxins. The product is currently floating on the groundwater in a plume that originates at the Montana Pole Plant and ultimately discharges into Silver Bow Creek. Figure 1 shows a plan view of the Montana Pole Plant with the estimated plume shaded in (Montgomery, 1993). The solubility of PCP (6.8 mg/L at 25°C and pH 2) is much greater than the safe drinking water maximum contaminant level (MCL) of 1 μg/l PCP.

Two oil/water separators were installed on site as part of the Environmental Protection Agency's (EPA) emergency removal action to separate PCP-contaminated diesel fuel from the groundwater. The oil/water separators are fed by


Lower Area One Operable Unit
Silver Bow Creek
Slag Wall
Active Railroad Line
Slag Wall
Buried Sewer Line
Dismantled Equipment Storage Building
5
4
3
2
1
Former Pole Plant
Chicago, Milwaukee, St. Paul & Pacific Railroad
Pole Storage Yard
Greenwood Avenue
Mount Moriah Cemetary
M-8
M-7
M-6
W-2
W10
W-4
W6
W3
W-5
W-8
W-13
W-15
Date Sampled | Thickness (feet)
11/90 | 0.08
6/91 | 0.01
Date Sampled | Thickness (feet)
11/90 | 0.01
6/91 | --
Date Sampled | Thickness (feet)
11/90 | 0.24
6/91 | 0.65
Date Sampled | Thickness (feet)
11/90 | 2.19
6/91 | 2.01
Date Sampled | Thickness (feet)
11/90 | 0.37
6/91 | --
Date Sampled | Thickness (feet)
11/90 | 0.46
6/91 | 0.22
LEGEND
Monitoring Well Location
-- Not Sampled
Estimated Extent of LNAPL
Site Features as of 1989
Railroad Tracks
Creek
Fence
Site Boundary
1 Removed Soils Storage Building
Note:
All sampling locations are shown on Figure 4-2.
0 200 400
SCALE IN FEET
MO-3
MONTANA POLE AND TREATING PLANT SITE
ESTIMATED EXTENT OF LNAPL PLUME
Figure - 1

pneumatic pumps that are located at the product/groundwater interface. The "clean-end" discharge of water from the separators has been found to contain PCP (Camp Dresser & McKee, 1989).

Research Objective

The main objective of this research is to determine the mass transfer rate of PCP from the floating product into the groundwater under quiescent conditions. Variables that effect the mass transfer rate such as pH, temperature, ionic strength of the water, and turbulence will be discussed. No published mass transfer coefficients were found for PCP in a two-phase (immiscible organic/water) solution. Therefore, laboratory experiments were conducted to calculate a mass transfer coefficient for PCP at the Montana Pole Plant. The experiments are described in detail in the Materials and Methods section of this report. The effects of pH, temperature, and ionic strength on the mass transfer rate, and ultimately on the solubility of PCP in water, will be discussed under the Mass Transfer Theory section.

The effects of turbulent groundwater pumping on the PCP mass transfer rate were also studied experimentally. If the pumping action is found to affect the transfer rate of PCP into groundwater, this information can be used to help quantify the amount of PCP that is leaving the oil phase at the site.

PCP has a density of 1.978. Therefore, an experiment was run to determine if PCP would behave like a dense non-aqueous phase liquid (DNAPL) and sink in the groundwater aquifer once it transfers from the oil phase. The settling of a separate PCP phase in the aquifer would have a great impact on the overall cleanup of the site.

Finally, PCP concentrations in some groundwater samples measured at the site exceeded the theoretical saturation level for PCP in water that is listed in the current literature (14 mg/L at 20°C). Most of the current literature gives no mention of what the Ph was when the solubility was determined. The experiments conducted will help to determine if PCP concentrations can exist that are higher than the theoretical solubility of 14 mg/l at 20°C that is currently being cited.

MASS TRANSFER THEORY

Mass Transfer in Liquid/Liquid Systems

Mass transfer of PCP from a non-aqueous to an aqueous phase liquid occurs as the high concentrations of PCP in the non-aqueous phase are transferred to the water until an equilibrium concentration is reached. The equilibrium concentration of PCP in the water for an oil and water system is not necessarily the aqueous saturation value of PCP because of the partitioning that exists between the oil and water

phases. The mass transfer flux can be expressed in terms of milligrams of PCP per square meter per hour exiting the non-aqueous phase into the water.

The mass transfer coefficient of PCP into the groundwater can be calculated by measuring PCP concentrations in the aqueous phase as a function of time (Cussler, 1984: Jost, 1960) and expressed by the following equation:

$$J=K(C_i-C_b), \tag{1}$$

where:

J = the flux of solute (PCP) in $mg/(m^2 \cdot hr)$;

K = the overall mass transfer coefficient in m/hr;

C_i = the PCP concentration at the non-aqueous/aqueous phase interface in mg/m^3;

C_b = the PCP concentration in the bulk phase of the water in mg/m^3.

This general equation assumes that the PCP concentration in the water at the interface is in equilibrium with the non-aqueous phase, and therefore, C_i is the equilibrium value of PCP in the water. Equation (1) is useful for calculating the mass transfer of PCP in a static system. No solubility values for PCP-diesel fuel mixtures and water were found, therefore the equilibrium value of PCP in groundwater must be determined

experimentally at the Montana Pole Plant.

The flux (J) of PCP from the non-aqueous phase to the aqueous phase is found by:

$$J=\frac{(C_b*V)}{(A*T)} \tag{2}$$

Where:

V = volume of groundwater measured in m^3;

A = area of the non-aqueous/aqueous interface boundary in m^2;

T = time of interface exposure in hours.

The bulk phase concentration (C_b) is measured analytically at various time intervals. With the flux calculated in equation 2, the mass transfer coefficient (K) can be found from equation 1.

A second approach to analyzing mass transfer of PCP from the non-aqueous phase to the aqueous phase can be found by calculating the flux (J) from equation 2 and plotting it verses the PCP concentrations found at the sample time intervals. This plot would give a flux for various PCP concentrations found on the site. A low PCP concentration in the water should indicate a high flux. The flux should decrease as the PCP concentrations approach equilibrium in the groundwater. With groundwater velocity and soil adsorption

considered, the groundwater PCP concentrations would be expected to remain in the lower range. Therefore, the flux at the Montana Pole Plant would be high. PCP flux is calculated in the Results and Discussion section of this report.

Effect of pH on the Solubility and Mass Transfer of PCP

PCP is a weak organic acid that readily dissociates at higher pH values. Lower pH values favor the formation of molecular PCP (C_6Cl_5OH) while higher pH values favor the ionization of PCP into pentachlorophenolate ions ($C_6Cl_5O^-$) and hydrogen ions (H^+). Equation 3 shows the dissociation of neutral PCP to the pentachlorophenolate and hydrogen ion.

$$PCP_T \rightarrow PCP^0 + H^+ + PCP^- \qquad (3)$$

Where:

PCP_T = total neutral and ionized PCP

PCP^0 = neutral PCP

H^+ = hydrogen ion

PCP^- = pentachlorophenolate ion

A lower pH keeps the PCP with the product (hydrophobic) and slows the mass transfer rate, thereby increasing the effectiveness of separating the PCP/diesel fuel mixture from the water. Higher pH water would increase the mass transfer

rate until the PCP reaches its equilibrium concentration in the water. Table 1 shows the theoretical relationship of pH and the fraction of PCP in its molecular (neutral) and ionic forms. The decimal fraction of PCP which is in the neutral form can be calculated by using equation 4:

$$\alpha_{PCP^0} = \frac{PCP^0}{PCP_T} = \frac{1}{(1+10^{(pH-pKa)})} \qquad (4)$$

Where:

$\alpha_{PCP}{}^0$ = the decimal fraction of PCP in the neutral form

PCP^0 = neutral PCP

PCP_T = total dissolved concentration of PCP (PCP^0 + PCP^-)

pH = negative log of the hydrogen ion concentration

pKa = acid dissociation constant (pKa = $10^{-4.74}$)

This data is plotted and shown in Figure 2.

The PCP saturation value in water is needed when studying the mobility of pentachlorophenol at the Montana Pole Plant. The saturation value, as well as the apparent partition coefficient (Kp_{app}), for PCP is needed when applying equation 1 to find the mass transfer coefficient of PCP into the groundwater. The apparent partition coefficient is discussed later in this section. The PCP saturation value that has been listed in the remedial investigations for the Montana Pole Plant is 14 mg/L. Although the remedial investigations, as well as the current literature on PCP, mention the ionization

Table 1. Relationship of pH and fraction of PCP in neutral and ionic forms.

pH	Fraction Neutral	Fraction Ionic
2.0	1.00	0.00
2.5	0.99	0.01
3.0	0.98	0.02
3.5	0.95	0.05
4.0	0.85	0.15
4.5	0.63	0.37
5.0	0.35	0.65
5.5	0.15	0.85
6.0	0.05	0.95
6.5	0.02	0.98
7.0	0.01	0.99

of PCP as a function of pH, no literature has been found that lists the solubility of PCP as a function of pH.

Two sources mentioned in the literature that list PCP saturation values are the Ambient Water Quality Criteria for Pentachlorophenol (EPA, 1980) and the Handbook of Environmental Data on Organic Chemicals (Verschueren, 1983). EPA lists the saturation value of PCP at 14 mg/L at 20°C. Verschueren lists the same saturation value at 20°C as well as other values at various temperatures. These values are listed in the Temperature Effects on Mass Transfer section of this report. No mention of pH was given for these saturation values. The only report found in the literature that gave the saturation value at a given temperature and pH was the IUAPAC

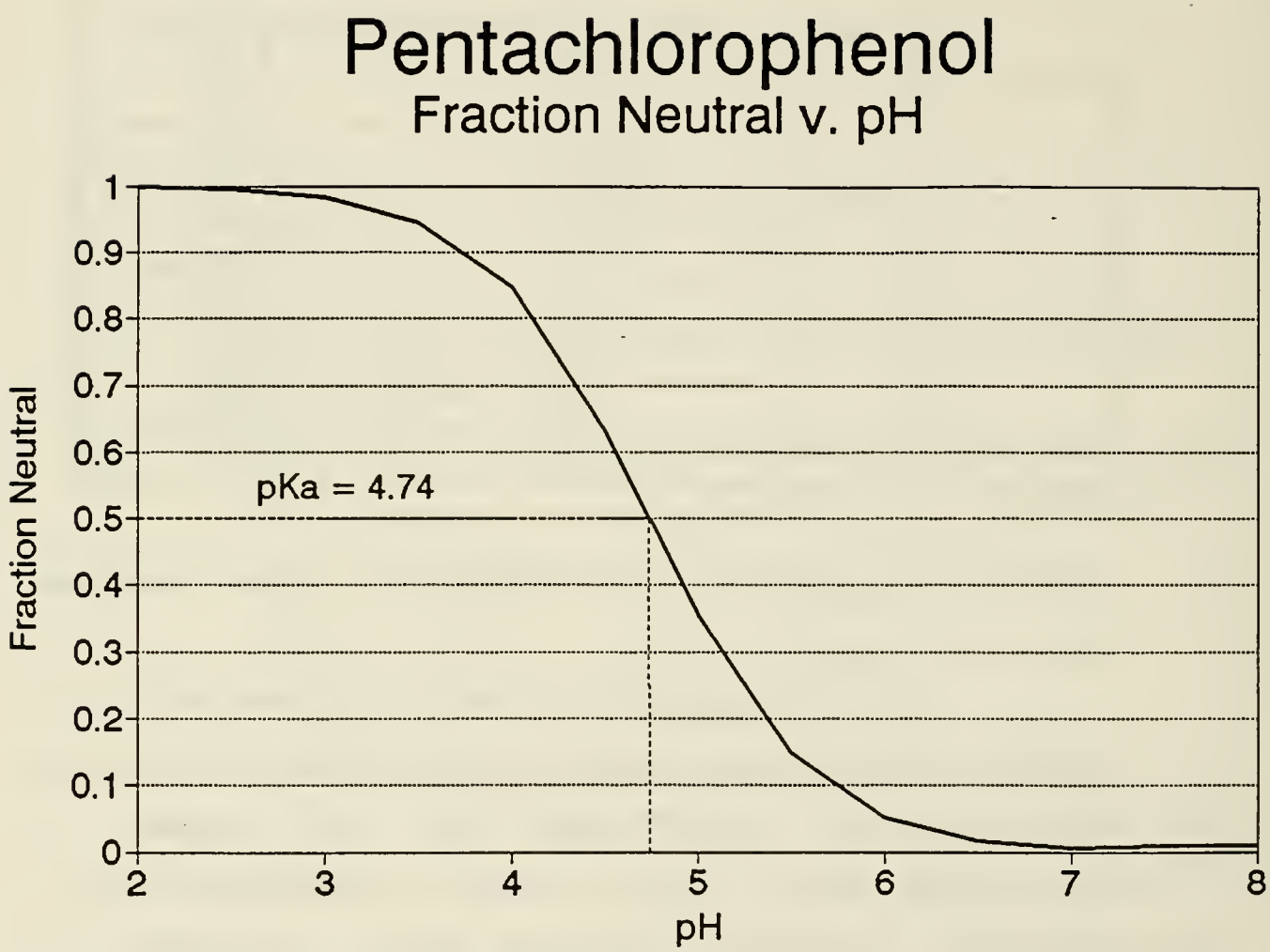


Figure 2. PCP neutral fraction versus pH.

Report on Pesticides, Environmental Chemistry of Pentachlorophenol (Crosby *et al.*, 1981). This report listed a saturation value of 18 mg/L at 20°C and a pH of 5. With this information a theoretical PCP saturation range can be calculated that varies with pH.

The 18 mg/L value must first be adjusted from 20°C to 25°C to keep it consistent with the pKa and the Kp values listed at 25°C. This adjustment for temperature is explained in the Temperature Effects on Mass Transfer section of this report. The temperature corrected saturation value is 19.3 mg/L at 25°C and a pH of 5. The solubility of PCP in water can now be calculated at various pH levels by solving equation 4 for the neutral PCP concentration ($\alpha_{PCP}{}^{0} = 1$):

$$\alpha_{PCP^0} = \frac{PCP^0}{PCP_T} = \frac{1}{(1+10^{(pH-pKa)})} \quad (4)$$

$$1 = \frac{PCP^0}{PCP_T} = \frac{1}{(1+10^{(pH-pKa)})}$$

multiplying numerator and denominator by PCP^0 gives:

$$1 = \frac{PCP^0}{PCP_T} = \frac{PCP^0}{(PCP^0 + PCP^0 * 10^{(pH-pKa)})}$$

it can now be seen that the total dissolved concentration of PCP (PCP_T) is:

$$PCP_T = (PCP^0 + PCP^0 * 10^{(pH-pKa)}) \quad (5)$$

The pKa of PCP at 25°C is 4.74. By using the 19.3 mg/L as the total dissolved concentration of PCP at a temperature of 25°C and pH = 5, a PCP^0 value of 6.8 is calculated from equation 5. As shown in Table 1, the neutral PCP occurs at a pH of 2. With the neutral PCP saturation value now established at 6.8 mg/l at 25°C and pH = 2., the saturation values of PCP in water can now be predicted at varying pH levels. Table 2 lists the PCP solubility at 25°C for different pH levels.

Table 2. PCP solubility at 25°C as a function of pH.

pH	Solubility (mg/L)	pH	Solubility (mg/L)
2	6.8	5.5	46
2.5	6.8	6	130
3	6.9	6.5	398
3.5	7.2	7	1244
4	8.0	7.5	3920
4.5	10.7	8	12381
5	19.3	8.5	39137

This data agrees with the work of Valsaraj and Springer (1986) which lists the solubility of PCP at 25°C at 5 to 12 mg/L for a pH range of 3.5 to 4.5. Table 2 data would predict the PCP concentrations at 7.2 to 10.7 mg/L. PCP solubility at the pKa of 4.74 and 25°C would calculate to be 13.6 mg/L which agrees with much of the literature that lists the solubility at the pKa of 4.74 to be 14 mg/L.

The saturation of PCP at 25°C at a pH of 7 is 1244 mg/L. This is significantly higher than the saturation of 14 mg/L that is currently used for the Montana Pole Plant. A semi-log plot of the saturation data is shown in Figure 3.

TEMPERATURE EFFECTS ON MASS TRANSFER

The solubility of PCP in water is temperature dependent as shown in Table 3. By analyzing the data from Verschueren on a semi-log plot, the solubilities of PCP at 10 and 25°C were calculated and added to the data. The 10°C solubility is needed because it was the temperature used in the experiments to represent the groundwater at the Montana Pole Plant. The 25°C solubility of PCP is needed because the pKa data is listed at this temperature. If PCP's pKa value of 4.74 is used in equation 5, then this equation is only valid at 25°C.

A ratio between PCP solubility at 25°C and 20°C was calculated from Verschueren's data and was multiplied to the 18 mg/L at 20°C solubility from the IUAPAC report to establish the PCP solubility at a temperature of 25°C and a pH of 5. The solubility calculated at 25°C and a pH of 5 was 19.3 mg/L. This number was then used in equation 5 to solve for the PCP^0 concentration which was calculated to be 6.8 mg/L. PCP^0 is the PCP concentration at a pH of 2 and is theoretically 100% neutral.

With PCP^0 now established at 6.8 mg/L, the pH used to

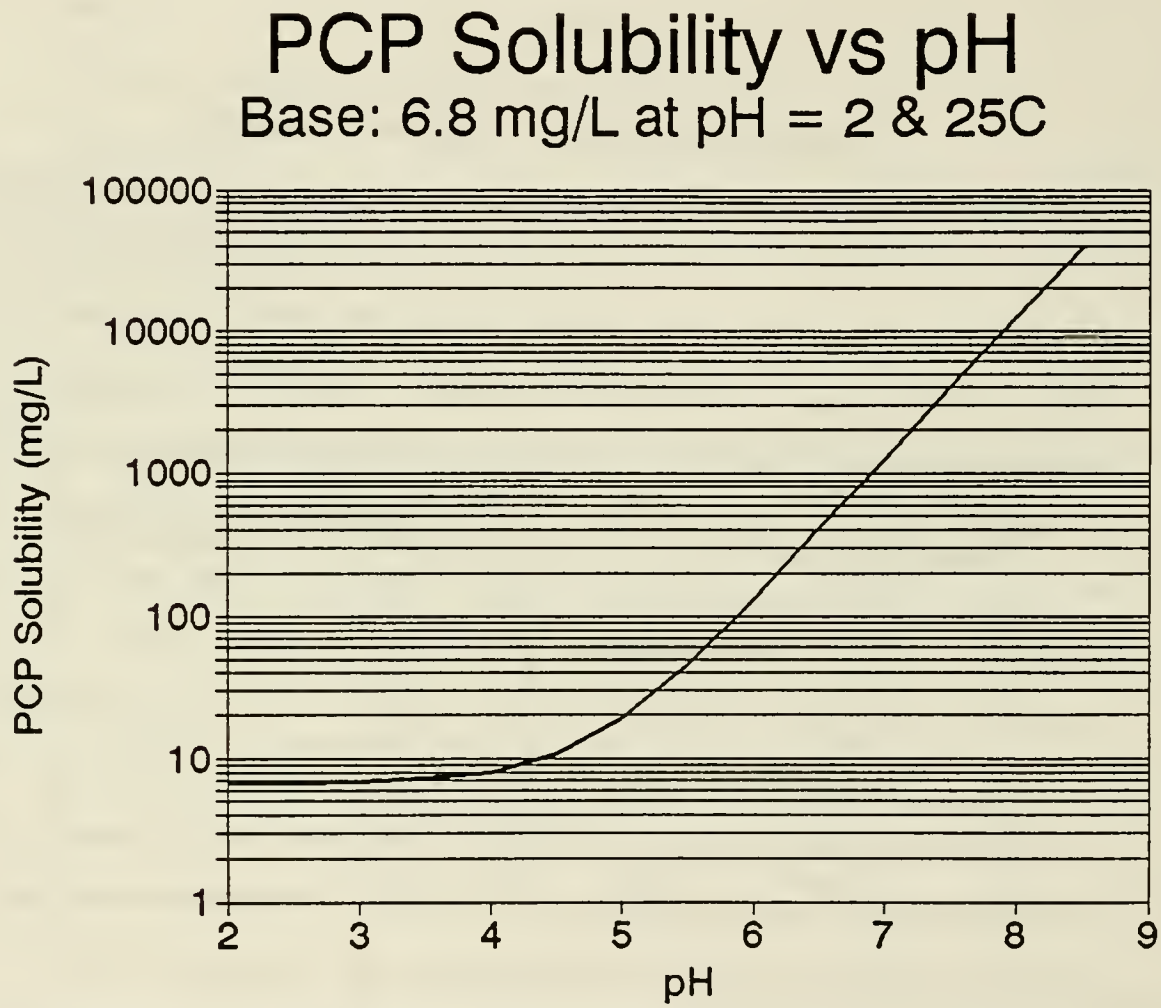


Figure 3. PCP solubility versus pH at a pH of 2 and 25 C.

Table 3. PCP solubility in water.

Temp. (°C)	Solubility pH = 5 (mg/L)	Solubility pH = 4.82▲ (mg/L)	Solubility pH = 2 (mg/L)	Solubility pH = 7 (mg/L)
0	6.4	* 5	2.3	415
10	10.3	8	3.6	663
20	** 18	* 14	6.3	1161
25	19.3	15	6.85	1244
30	25.7	* 20	9.1	1659
50	45	* 35	15.9	2903
70	109	* 85	38.5	7049

* Data obtained from the Handbook of Environmental Data on Organic Chemicals (Verschueren, 1983).

** Data obtained from the IUAPAC Report on Pesticides, Environmental Chemistry of Pentachlorophenol (Crosby *et al.*, 1981).

▲ pH calculated for this data based on P_o = 6.8 mg/L at pH of 2 and T = 25°C.

calculate the solubility data given by Verschueren can be estimated by once again utilizing equation 5 to solve for the pH value that gives a PCP solubility of 15 mg/L at 25°C. The pH calculated was 4.82. This pH value is very close to the pKa for PCP of 4.74 and confirms again that the 14 mg/L solubility listed for PCP was measured at a pH near the pKa of PCP. The solubility of PCP at 25°C and at a pH of 7 was calculated at 1244 mg/L. The same ratios that were used above from the Verschueren data were applied to the 1244 mg/L

solubility value to find the PCP solubility at a pH of 7 at various temperatures. PCP solubility versus temperature at a pH of 7 is plotted in Figure 4.

The temperature measured on site and from Mount Moriah Cemetery averaged approximately 9°C. This temperature represents summer and fall groundwater temperatures because no winter readings were taken at the site. The experiments in this study were conducted at 10 ± 1 °C to represent the temperatures found at the site and to hold the temperature as steady as possible to eliminate any effects of temperature on PCP solubility and mass transfer. The solubility of PCP at 10°C and at a pH of 7 is 663 mg/L and is used to represent the conditions found at the Montana Pole Plant.

Table 4 lists PCP solubility values at temperature and pH ranges that may be found at the Montana Pole Plant. These PCP solubilities were calculated as was described for the Table 4 data.

Table 4. PCP solubility as a function of pH and temperature.

pH ↓	PCP Solubility (mg/L)		
8.5	17869	21023	26541
8.0	5654	6652	8398
7.5	1790	2106	2659
7.0	564	663	838
6.5	182	214	270
Temperature→	5°C	10°C	15°C

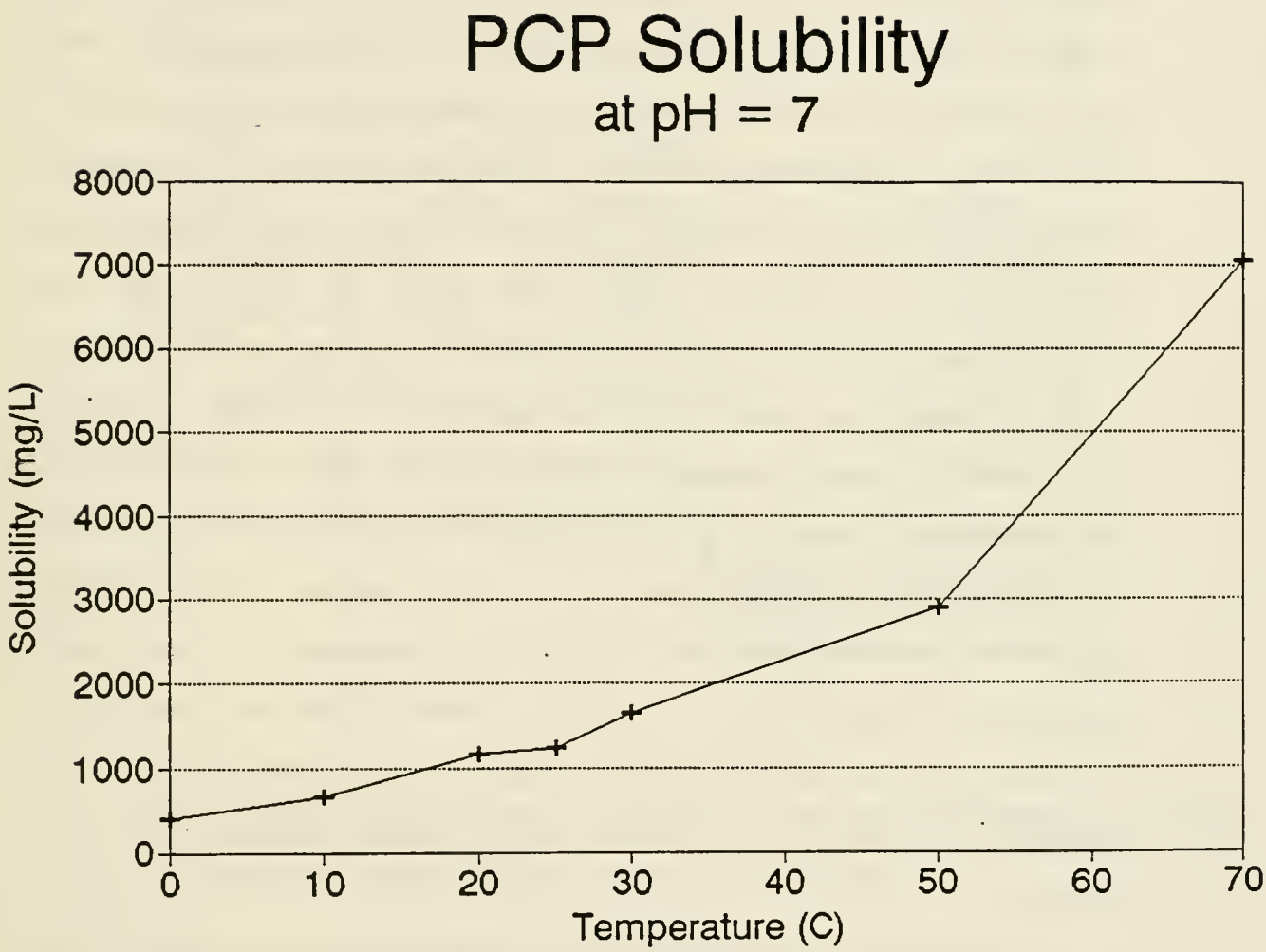


Figure 4. PCP solubility versus temperature at a pH of 7.

IONIC STRENGTH INFLUENCE ON PCP MASS TRANSFER

Mass transfer rates and solubility of chlorinated phenols such as PCP can be modified by being partially or totally ionized (Lee *et al.*, 1991). Just as pH affects the solubility of PCP in water, the ionic strength of the aqueous phase has been proven to have some effect on the aqueous solubility of PCP as well. The ionic strength of the water phase influences the partitioning of the negatively-charged organic compounds (Westall *et al.*, 1985). Under more basic pH conditions the PCP molecule ionizes by losing a hydrogen atom and therefore is more likely to partition to the aqueous phase. In very high ionic strength waters, the PCP ion can gain a cation and become less ionic. This molecule may then be able to partition with the non-aqueous phase once again. At pH levels below 7 the distribution of PCP is dominated by the mass transfer of the neutral PCP and is independent of the ionic strength of the aqueous phase. However, at very high ionic strengths there is a "salting out" effect (Westall *et al.*, 1985).

Because high ionic strength groundwater can decrease the solubility of PCP in the aqueous phase if the non-aqueous/ aqueous phases are mixed, the actual groundwater used in the experiments from the Montana Pole Plant was analyzed. Groundwater collection will be discussed in the Materials and Methods section. Table 5 lists the ions found in the groundwater collected for the laboratory experiments.

Table 5. Ionic strength of groundwater.

Ion	C_i mg/L	C_i moles/L	Z_i^2	$C_iZ_i^2$ moles/L
Ca	180	0.004491	4	0.0180
Mg	41.1	0.001691	4	0.0068
Na	56.0	0.002436	1	0.0024
K	6.9	0.000176	1	0.0002
Fe	0.220	0.000004	9	0.0000
Mn	0.006	0.000000	4	0.0000
HCO_3	228	0.003737	1	0.0037
Cl	28.7	0.000810	1	0.0008
SO_4	481	0.005007	4	0.0200
N	1.08	0.000077	1	0.0001
F	1.75	0.000092	1	0.0001
Sr	1.135	0.000013	4	0.0001
			TOTAL	=0.0522
			$1/2\sum C_iZ_i^2$	=0.026

The ionic strength was calculated by using the equation listed in the USGS Water-Supply paper 2254 (1989):

$$\mu = \frac{1}{2}\sum c_i Z_i^2 \qquad (6)$$

Where:

μ = Ionic strength of groundwater;

c_i = Ion concentration in groundwater;

Z_i = Ionic charge.

The ionic strength calculated by equation 6 for the groundwater was 0.026 moles/L. The influence of the ionic strength of the groundwater PCP partitioning can be determined from Figure 5 (Westall *et al.*, 1985). Figure 5 shows the distribution ratio of PCP between octanol and water for several ionic strengths. The distribution ratio is defined as the total non-ionic and ionic PCP concentration in the nonaqueous phase divided by the total non-ionic and ionic PCP concentration in the aqueous phase:

$$D = \frac{[\overline{PCP_T}]}{[PCP_T]} \tag{7}$$

The overbar in Equation 7 indicates a molecule in the non-aqueous phase. The distribution ratio (D) is the same as the apparent partition constant (Kp_{app}) that will be discussed in the PCP Non-aqueous/Aqueous Partition Constants section of this report.

As can be seen in Figure 5, ionic strength would not have an effect on the solubility of PCP in the aqueous phase at the 7 to 7.2 pH range found in the groundwater at the site. Any effect on the PCP mass transfer of the 0.026 molar solution groundwater would not occur until a pH of 8 or higher was reached.

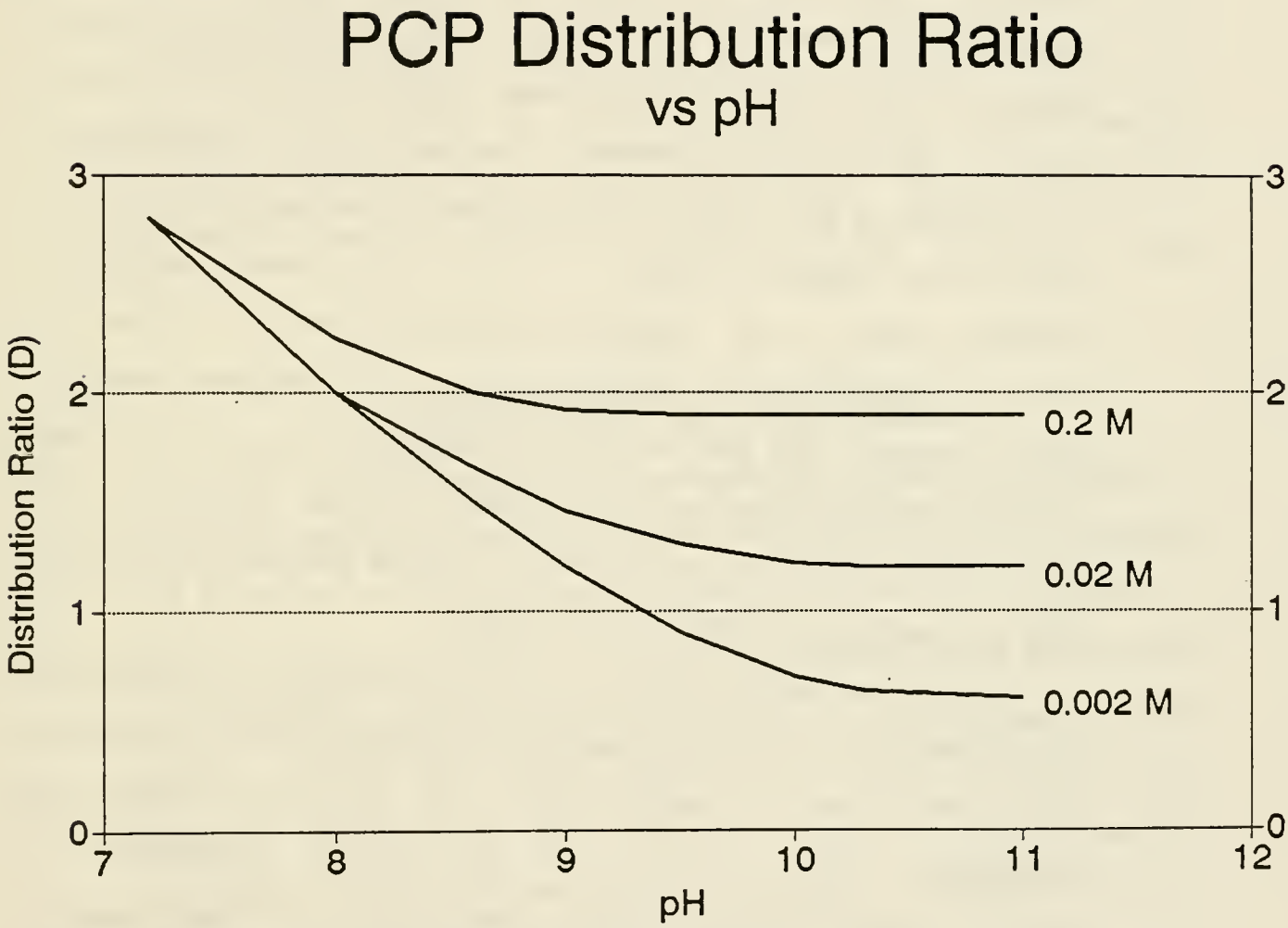


Figure 5. Distribution ratio of PCP as a function of pH and ionic strength.

PCP NON-AQUEOUS/AQUEOUS PARTITION CONSTANTS

When dealing with a non-aqueous/aqueous phase system such as the Montana Pole Plant, the saturation value of the PCP in the groundwater may not be reached because of the partitioning that exists between the two phases. This partitioning between the diesel fuel and aqueous phases limits the amount of PCP that can enter the groundwater. The partition constant (Kp) is the ratio of the non-ionized PCP molecules between the non-aqueous and aqueous phases. The octanol/water partition constant (Kow) is an important parameter that is used to predict equilibrium concentrations in non-aqueous/aqueous phase systems. The Kow is similar to the Kp in that only the non-ionized molecules are considered. The Kow listed for PCP is $10^{5.01}$ and, since it only applies to the neutral PCP, would only be useful at a pH of less than 3.

Much experimental work has been performed in regards to the influence of pH on the aqueous/non-aqueous distribution of PCP (Westall et al.,1985; Jafvert et al.,1990; Kaiser and Valdmanis, 1981). In all of the studies performed, an octanol/water system was used. The results of these studies followed theory in that the distribution of PCP was very pH-dependent. Kaiser and Valdmanis (1981) described the partition coefficients over a pH range of 1.2 to 13.5 in terms of an apparent partition coefficient (Kp_{app}). The Kp_{app} represents the distribution of the sums of both ionized and non-ionized PCP molecules between the non-aqueous/aqueous

phases of the test system. The Kp_{app} found at a pH of 7.2 was $10^{3.32}$. This is a 98% reduction from the $10^{5.01}$ Kow that is listed for PCP.

The Kp_{app} of $10^{3.32}$ that was found in an octanol/water system at a pH of 7 helps to better predict the equilibrium PCP concentration found in the aqueous phase: however; this value may not be accurate in describing the diesel fuel-PCP/water system found at the Montana Pole Plant. The Kp_{app} will be determined experimentally at a temperature of 10°C and at a pH of 7.

COSOLVENT EFFECTS ON PCP SOLUBILITY

Organic cosolvents such as acenaphthylene, fluoranthene, fluorene, and naphthalene found in the diesel fuel/PCP mixture are slightly soluble in water and can increase the solubility of PCP in the groundwater. Cosolvency effects have been noted by researchers studying PCP solubility in non-aqueous/aqueous systems (Lee *et al.*, 1991; Rao *et al.*, 1990). Valsaraj and Springer (1986) noted that PCP solubility has been known to increase to larger values due to a solubilizing effect caused by oils and emulsions present in wastewater.

Increases in solubility due to cosolvency result in a decrease in the sorption of the solute (PCP) to soils. Recent studies have shown that with increasing cosolvent content, decreases in sorption of weakly acidic organic solutes such as PCP occur (Lee *et al.*, 1990). The decrease in sorption by

soils because of cosolvency reflects an increase in the mobility of hydrophobic organic chemicals (HOCs) such as PCP. The cosolvent effect is expected to be most pronounced in the "near field" region of the contaminated sites where the cosolvents are present in high concentrations. Concentrations of the cosolvents may be found at considerable distances from the contaminated site. Therefore, the cosolvency effects may need to be considered in "far-field" regions as well (Rao *et al.*, 1990).

The effects of cosolvency on PCP mass transfer were not addressed in this study. PCP entering the groundwater through cosolvent effects will be accounted for in the apparent partition coefficient K_{app} measured in the experiments for the Montana Pole Plant.

TURBULENT MIXING IMPACTS ON PCP MASS TRANSFER RATES

In calculating a mass transfer coefficient, the conditions very near the phase boundary are of concern, because it is at this boundary that much of the resistance to mass transfer is found. The transfer of mass and momentum in turbulent flow occurs by similar mechanisms and studies have applied what is known about momentum transfer near a phase boundary to turbulent mass transfer. Momentum transport has been studied much more intensively than has mass transfer (Sherwood *et al.*,1975). These studies predict an increase in

the PCP mass transfer rate due to the turbulent pumping occurring on site.

Mass transfer in a turbulent stream is essentially a mixing process whereby mass is transported by the mixing and blending of the eddies that are formed. This is referred to as eddy diffusion (Sherwood *et al.*,1975). Eddy diffusion occurs very rapidly and in the case of this mass transfer study can be thought of as occurring almost instantaneously as the product is turbulently mixed by the turbulent groundwater pumping action. A comparison of mass transfer rates between a quiescent system and a turbulent system cannot be adequately made because sampling for PCP concentrations in the water would show oversaturation or supersaturation concentrations because of the emulsion still present in the water.

Any non-polar PCP molecules that may have been formed by the cations in the groundwater could be partitioned to the non-aqueous phase during this pumping action as was discussed in the Ionic Strength Influence on PCP Mass Transfer section of this report.

The effects of turbulence on PCP mass transfer were analyzed by comparing both turbulent as well as quiescence laboratory experiments. The experimental procedure for turbulent influence on PCP mass transfer is explained in the following Materials and Methods section of this report.

MATERIALS AND METHODS

PCP/DIESEL FUEL MIXTURE COLLECTION

The product used in this research was taken from well #8 located at the Montana Pole Plant. Figure 1 showed the location of well #8 at the Montana Pole Plant. One gallon of product was pumped and collected from well #8 on September 24, 1992. A second gallon was collected on October 9, 1992 to ensure that enough product was available for the experiments. Both gallons of product were thoroughly mixed and 1 liter of product was taken to the lab to be used in the mass transfer experiments. The remaining product is currently being stored at the Montana Pole Plant.

GROUNDWATER COLLECTION

The groundwater was taken from a well directly upgradient of the Montana Pole Plant that has not been contaminated with PCP. The well used was well #4 at the Mount Moriah Cemetery. This location can also be seen in Figure 1. The well was pumped for 15 minutes before any water was collected to ensure that more than 3 casing volumes were discharged before sampling began. A sample of 100 liters of water was collected for the mass transfer studies and metals analysis.

EXPERIMENTAL DESIGN

A total of 67 samples were collected and analyzed for PCP during the laboratory experiments. An additional 13 samples were collected and analyzed for PCP for the initial groundwater and product concentrations, as well as quality assurance/quality control (QA/QC) sampling. QA/QC procedures followed during sampling included duplicates, rinseate blanks, trip blanks, and bottle blanks. Rinseate samples consisted of rinsing the cleaned separatory funnels used in the experiments with de-ionized water and analyzing the rinseate for PCP. Trip blanks consisted of a clean sample bottle filled with de-ionized water that was sent to the lab with the other samples. This sample is used to ensure that the samples were not contaminated during transport to the lab. The bottle blank sample was an unopened sample bottle that was sent to the lab for PCP analysis. This sample checked the bottles for PCP contamination.

The experiments were performed at the pH found in the groundwater at the collection point (pH=7.0). A 450 ml volume of groundwater was added to 500-ml separatory funnels, and 20 ml of product was carefully added by pipet to the top of the funnels. The density differences between the diesel fuel/PCP mixture (density <1) and groundwater separated the two phases. These experiments represent the ambient physiochemical conditions of the product as it floats on the groundwater. The 20 ml of product used in the experiments represents an

diesel fuel/PCP thickness of approximately 5/16 inch. PCP concentrations in the product floating on the groundwater at Montana Pole Plant average 24,000 mg/l (Keystone, 1991, well #8, & well #5).

In the mass transfer experiments, 435-ml aliquots of groundwater were removed at each sampling time from the bottom of the separatory funnels using the stop-cock. The volume required to reach the detection limit necessitated the use of individual separatory funnels for each sampling time. The remaining water was not removed from the separatory funnel so that product contamination of the water did not occur. The 15 ml of water remaining in the funnel represents a water thickness of 0.12 inches.

The water was added and removed from the separatory funnels on a weight basis to avoid losing PCP to additional glassware and contaminating the samples. An electronic balance was used to weigh 450 grams of groundwater that was added to the funnels and to weigh the 435 grams of water removed for sampling.

All samples were kept at a constant temperature of 10 ± 1°C (average summer groundwater temperature at the Montana Pole Plant) by keeping the samples in a cooling unit that was modified to hold the desired temperature. A cooler that could maintain a temperature of 10 ± 1°C and was large enough to hold numerous 500-ml separatory funnels was not available at the Montana College of Mineral Science and Technology

laboratory. Two soft drink vending machines were obtained from a local distributer and were modified by removing the soft drink dispensing racks and installing metal shelves. Holes were cut in the shelving to hold the separatory funnels. The coolers were adjusted to 10 ± 1°C and maintained this temperature throughout the experiments. The coolers were kept locked during the experiments to prevent any disturbance.

SAMPLING TIMES

The first experimental samples were taken from the aqueous phase of the product/groundwater mixture at 4 hours and at 24 hours. These times were chosen to estimate the saturation time of PCP from the non-aqueous phase to the aqueous phase. With the results of these two times obtained, additional sampling intervals were determined to best estimate the PCP mass transfer rate as well as the equilibrium concentration of PCP in water at the existing pH, ionic strength, and temperature of the site groundwater.

The second round of samples were taken at 2, 4, 8, 16, 24, and 240 hours. Much emphasis was placed on the first 24 hours because it was in this time range that the published theoretical PCP saturation of 14 mg/l was reached. The first 24 hours would also have the highest mass transfer flux and an accurate representation of this flux was desired. Laboratory problems were encountered during this second round of sampling which ultimately led to re-extractions of the entire round by

the lab.

Round three consisted of verification samples taken at 4, 8, 16, and 24 hours to check the integrity of the sample re-extractions. These samples proved the re-extractions to be valid.

Round four samples consisted of 353- and 1344-hour samples. The 1344-hour sample was taken to establish the equilibrium value of PCP in the groundwater for the Montana Pole Plant. The PCP concentrations found in the 1344 hour samples were higher than the 353-hour samples and so a fifth round of sampling was needed to find the equilibrium concentration of PCP in the aqueous phase.

The fifth round of samples consisted of 3153-hour samples and 240 hour samples to check the previous 240 hour samples that were lower than the theory predicted. To check that the mass transfer was not being limited by the amount of product used in the experiments, 240 hour samples that had increased diesel fuel/PCP mixture volumes were analyzed. The product and groundwater from one of the 240-hour samples were analyzed for PCP, Polynuclear Aromatic Hydrocarbons (PAH), and BTEX.

All of the separatory funnels utilized had to be cleaned and decontaminated before being used in the next sampling round. The contents of the funnels were first discarded into a container. The funnels were then rinsed with a low-grade hexane, cleaned with a non-phosphate soap, and rinsed with tap water. All of this rinseate was collected in a container to

be returned to the Montana Pole Plant. The separatory funnels were next rinsed with two de-ionized water rinses, rinsed with a 1% nitric acid solution, and rinsed with de-ionized water again. A 99.98% pure hexane was used for the next rinse followed by a final de-ionized water rinse. The teflon stopcocks were cleaned in this same way. The funnels were then placed in a 225°C oven for 4-hours. This was the maximum temperature possible for the available oven. A rinseate sample was taken of a separatory funnel and stopcock before the next round of sampling to confirm that there was no PCP contamination. The funnels proved to be cleaned throughout the experiments.

TURBULENT EFFECTS ON PCP MASS TRANSFER

To determine the effect of groundwater pumping on the rate of PCP partitioning into groundwater, a similar experiment to those listed above was conducted with the addition of a shaking step following water and product addition. The separatory funnels were hand shaken for 5 seconds every 5 minutes for one hour, and were then left quiet until samples were collected at 4 and 24 hours. The shaking time interval corresponds to the timed pneumatic groundwater pumps utilized at the Montana Pole Plant.

SETTLING EFFECTS OF PCP IN WATER

To sample for any development of a third, separate, denser PCP (density = 1.978) phase in the separatory funnels, experiments were run in which the water volume was removed in layers and analyzed separately. First, 145 grams of water was removed from the bottom of the funnel and analyzed. An additional 145 grams was removed representing the middle funnel volume and the final 145 grams was removed to represent the top section of the aqueous phase. Only the 15 grams of water at the interface boundary was left. These samples allow for an observation of any PCP settling to the bottom of the funnel after saturation is reached. The concentrations found in each layer can also be used to follow the PCP as it is transferred from the diesel fuel and diffused through the water until saturation is reached. These three sample concentrations can be averaged to give a third 435-gram sample of the bulk PCP concentration in groundwater.

ANALYTICAL METHOD

The PCP concentration of the diesel fuel/PCP mixture and groundwater were determined by gas chromatograph using EPA Method 8081 by Intermountain Labs in Bozeman, MT. The detection limit for this method for the sample volume used is 5μg/L. This method is for chlorinated pesticides and is used

in place of Method 8270 because the diesel fuel present in the water samples causes an interference in the PCP readings on the mass spectrometer. Random checks of method 8081 PCP values were made using method 8270.

RESULTS AND DISCUSSION

ERROR ANALYSIS

Analytical problems were encountered during this research that warrant discussion before the data is presented. Discrepancies were found in round two as well as in round 5 PCP analysis. In both cases, the PCP values were under-reported. These errors were detected by the duplicate samples that were used to check the reproducibility of the experiments between different sampling rounds. The 24 hour PCP analysis varied significantly in round two from the round one analysis. The same was true when comparing the 240 hour samples from round five to round two data. Plots of the data were also utilized to establish the PCP concentration verses time curve and data that did not follow this curve were re-analyzed. Upon re-extracting the PCP solutions, the lab confirmed that the original samples were under-reported and the corrected values fell within the established curve.

When the lab had to re-extract PCP samples, there was usually only a small amount of sample left and they would therefore end up with a more diluted sample to analyze. It was then observed by the lab that the more dilute sample did not have a precipitate form as was the case with the original samples. The lab determined that the error caused in sample round two and five were the result of oversaturating their extract with PCP and they were analyzing only that portion that went into solution.

It was then concluded that any future PCP sample dilutions must be checked to ensure that oversaturation is not reached. Unfortunately, this discovery was not made until the last sampling round and in the case of the turbulent mixing experiments, valuable information may have been lost.

Reproducing the laboratory experiments proved to be difficult as well. The errors that may have occurred during sampling include: Change in water or product chemistry over time; temperature variations in sampling events; mixing of the product used to ensure complete mixing before sampling; and PCP contamination in the lab. All of these items were addressed during sampling and are discussed in the Material and Methods section of this report. The analytical errors, combined with the difficulty in reproducing the mass transfer experiments, explain the spread in the data at certain time intervals.

It would be recommended that in future studies with high

PCP concentrations, that a complete review of the analytical method be completed. The sample dilutions can be discussed at this time with the laboratory to ensure that a precipitate is not formed during the extraction procedure.

INITIAL PCP CONCENTRATIONS OF PRODUCT AND GROUNDWATER

Table 6 lists the PCP concentrations found in the initial groundwater and product materials used in the experiments. The initial groundwater used is considered to have a PCP concentration of zero. The 0.01 mg/l value is just two times the detection limit of 0.005 mg/l. The product PCP concentrations are lower than the average PCP concentration of 24,000 mg/L mentioned previously.

Table 6. Initial PCP concentrations of groundwater and product used.

Sample ID	Description	Concentration
MPMT 013	Groundwater	0.01 mg/L
MPMT 014	Groundwater	<0.005 mg/L
MPMT 015	Product	7400 mg/L
MPMT 016	Product	8700 mg/l

MASS TRANSFER DATA

The raw data collected to determine the mass transfer rate of PCP is shown in Table 7 and plotted in Figure 6. The round 2 samples originally did not agree with the duplicated samples (4 and 24 hours) from round 1 and also showed a high rinseate blank concentration. The lab was convinced of the problem after the round 3 verification samples were analyzed and the round 2 samples were re-extracted and analyzed again with results that matched the duplicated round 1 samples.

Because of the problems with the analytical lab during round two sampling, the 240-hour samples were checked with the 353-hour samples. The other time intervals (4,8,16, and 24 hours) measured during round two sampling were verified with the round three samples and therefore could be used with confidence. Samples that did not get re-extracted during round 2 because of insufficient sample size remaining, or samples that deviated greatly from the mean, were thrown out.

Samples MPMT037-1, MPMT030, MPMT028-2, and MPMT026-2 did not have enough extract to re-analyze and so they were thrown out of the data set. Sample MPMT019 was re-extracted during round two, but it deviated so much from the mean that it was questionable and was eliminated as well. The samples that were used for the mass transfer calculations are shown in Table 8 and are plotted in Figure 7.

Table 7. PCP Raw Data Collected.

Sample Number	Time (hr)	Conc. (mg/l)	Sample Number	Time (hr)	Conc. (mg/l)
MPMT037-3	2	2.4	MPMT005-3	24	18
MPMT037-2	2	4.6	MPMT005-2	24	15
MPMT037-1	2	0.01	MPMT005-1	24	16
MPMT038-3	2	3.1	MPMT026-3	24	17
MPMT038-2	2	3.3	MPMT026-2	24	8.8
MPMT038-1	2	3.3	MPMT026-1	24	18
MPMT039	2	4.7	MPMT040	24	20
MPMT010	4	4.7	MPMT019	240	14
MPMT011	4	4.0	MPMT020-3	240	47
MPMT012-3	4	5.1	MPMT020-2	240	41
MPMT012-2	4	3.8	MPMT020-1	240	39
MPMT012-1	4	1.4	MPMT021-3	240	50
MPMT033-3	4	3.5	MPMT021-2	240	68
MPMT033-2	4	3.0	MPMT021-1	240	54
MPMT033-1	4	3.2	MPMT054	240	92
MPMT043	4	5.1	MPMT055	240	59
MPMT030	8	3.7	MPMT056	240	100
MPMT031-3	8	9.5	MPMT057	240	53
MPMT031-2	8	7.0	MPMT046-3	353	72
MPMT031-1	8	5.3	MPMT046-2	353	63
MPMT032-3	8	7.7	MPMT046-1	353	80
MPMT032-2	8	7.8	MPMT047-3	353	122
MPMT032-1	8	8.6	MPMT047-2	353	89
MPMT042	8	9.1	MPMT047-1	353	110
MPMT027	16	16	MPMT022-3	1344	170
MPMT028-3	16	12	MPMT022-2	1344	120
MPMT028-2	16	5.2	MPMT022-1	1344	160
MPMT028-1	16	14	MPMT023-3	1344	120
MPMT029-3	16	12	MPMT023-2	1344	130
MPMT029-2	16	12	MPMT023-1	1344	90
MPMT029-1	16	14	MPMT024-3	3153	140
MPMT041	16	15	MPMT024-2	3153	110
MPMT003	24	15	MPMT024-1	3153	140
MPMT004	24	15			

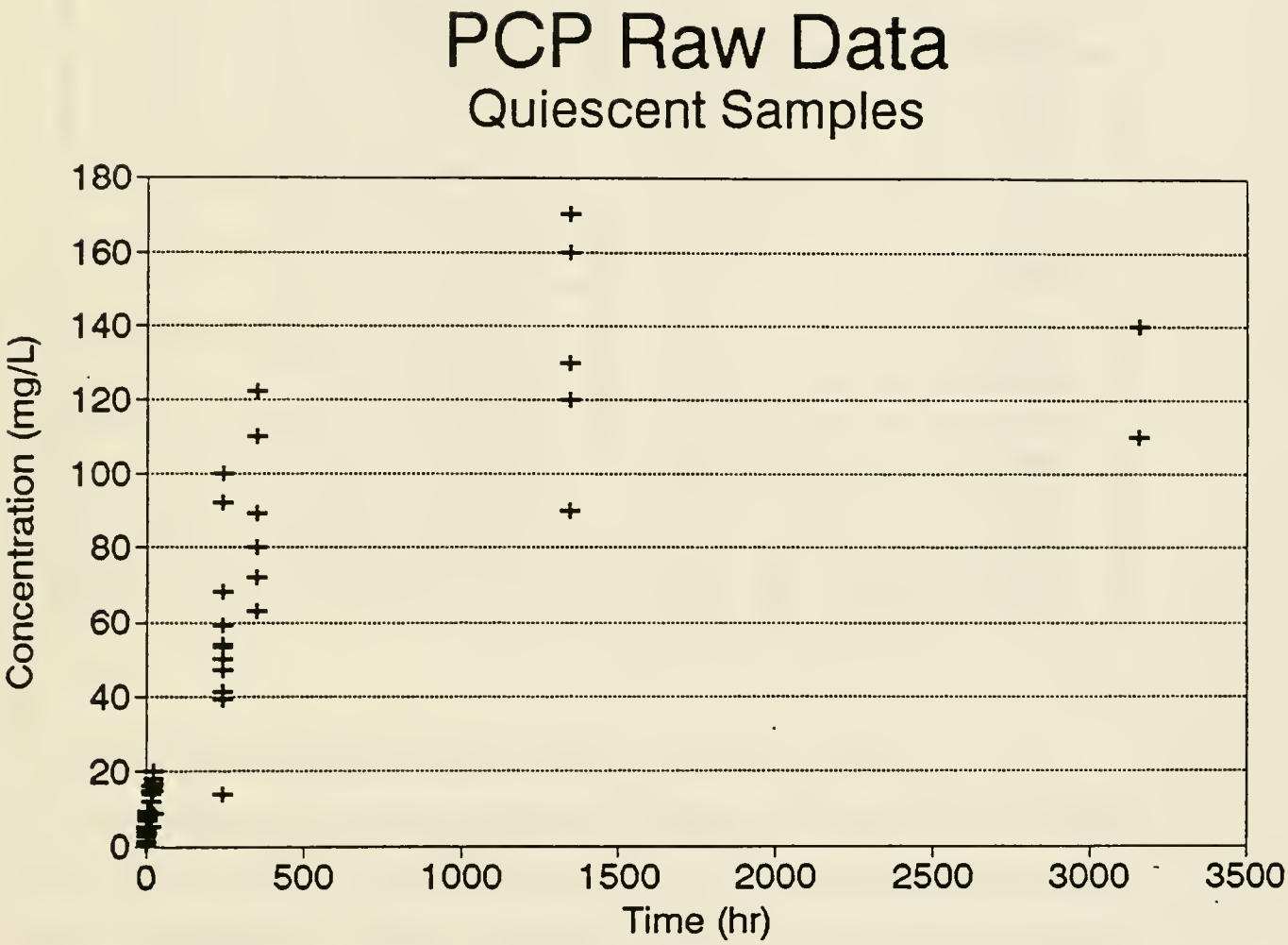


Figure 6. PCP raw quiescent data collected.

Table 8. PCP mass transfer reduced data.

Sample Number	Time (hr)	Conc. (mg/l)	Sample Number	Time (hr)	Conc. (mg/l)
MPMT037	2	2.34	MPMT004	24	15
MPMT038	2	3.23	MPMT005	24	16.33
MPMT039	2	4.7	MPMT026	24	17.5
MPMT010	4	4.7	MPMT040	24	20
MPMT011	4	4.0	MPMT020	240	42.3
MPMT012	4	3.43	MPMT021	240	57.3
MPMT033	4	3.23	MPMT054	240	92
MPMT043	4	5.1	MPMT055	240	59
MPMT031	8	7.27	MPMT056	240	100
MPMT032	8	8.03	MPMT057	240	53
MPMT042	8	9.1	MPMT046	353	71.7
MPMT027	16	16	MPMT047	353	107
MPMT028	16	13	MPMT022	1344	150
MPMT029	16	12.67	MPMT023	1344	113
MPMT041	16	15	MPMT024	3153	132.3
MPMT003	24	15			

Much of the mass transfer data was collected from 0 to 24 hours. This was done primarily because of the literature that stated the solubility of PCP in water to be 14 mg/L. The PCP concentrations at 24 hours averaged 17 mg/L, therefore, the sampling plan concentrated on the first 24 hours. The 240-hour sample averaged 67 mg/L and confirmed that the 14 mg/L solubility of PCP was incorrect at a pH of 7 and 10°C. The 353, 1344, and 3153 hour samples were then collected. The 0 to 24 hour data is plotted in Figure 8.

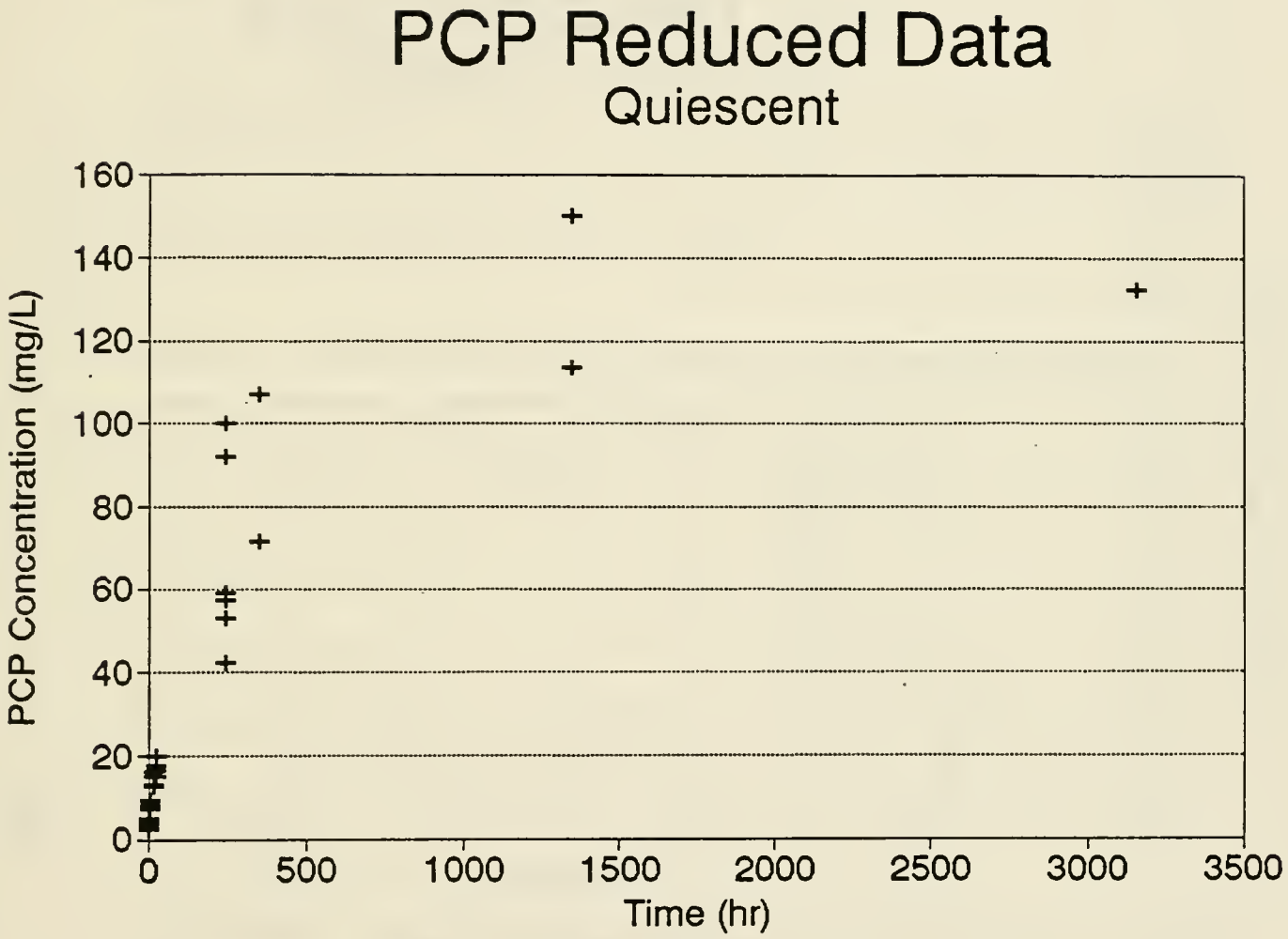


Figure 7. PCP reduced quiescent data.

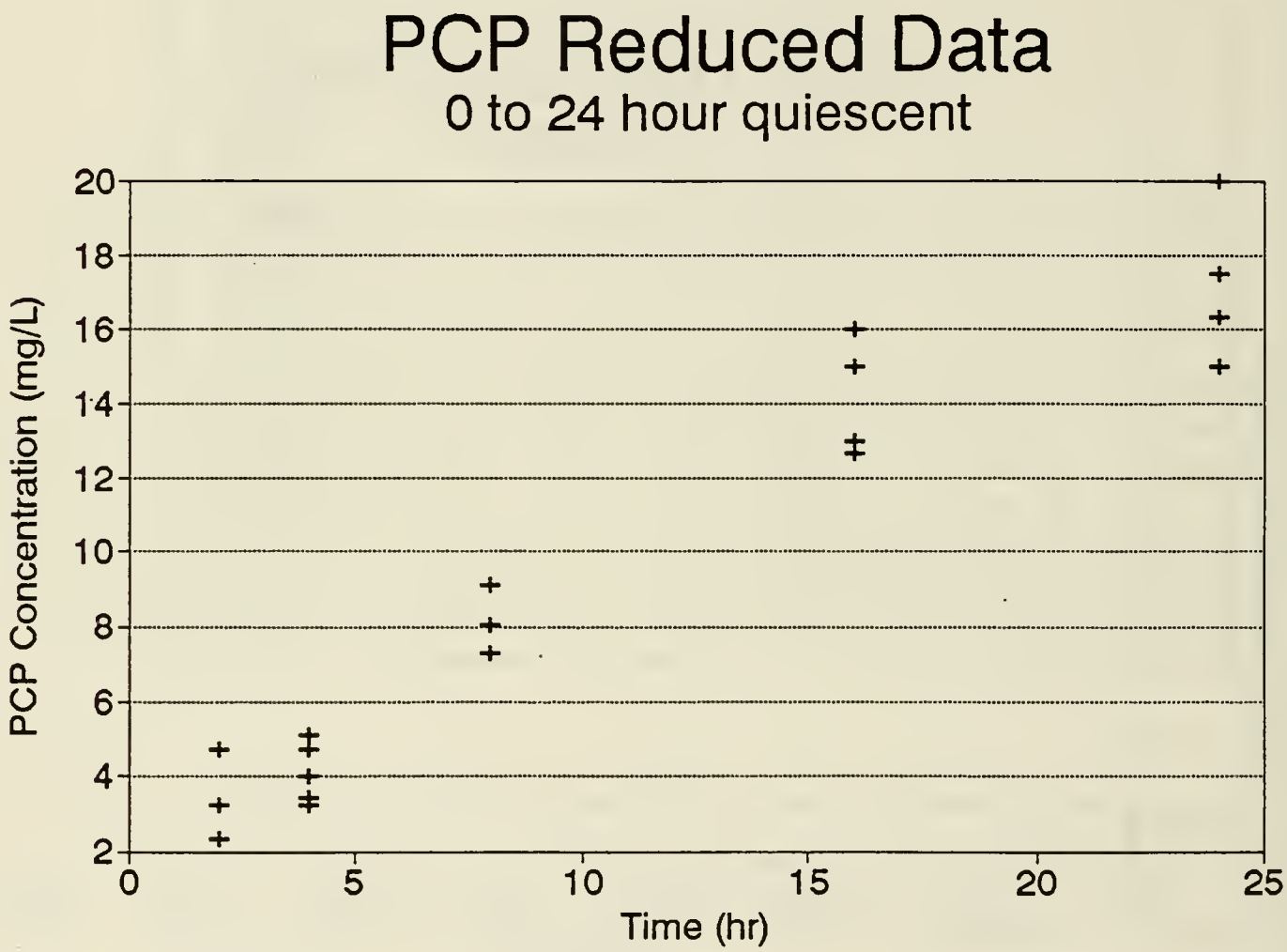


Figure 8. PCP 0 to 24 hour reduced quiescent data.

PCP MASS TRANSFER RATE CALCULATIONS

The PCP flux (J) was calculated by using equation 2 and is shown in Table 9. Figure 9 shows the relationship of PCP flux verses groundwater PCP concentrations. It can be clearly seen that the flux is highest for the lower PCP groundwater concentrations as was predicted. The flux at the lower PCP concentrations of 0 to 3.4 mg/L in the groundwater is high at 109 $mg/m^2 \cdot hr$. The flux drops to 3 $mg/m^2 \cdot hr$ for concentrations approaching equilibrium at 132 mg/L.

Table 9. PCP flux calculations for Montana Pole Plant.

Time (hr)	Concentration (mg/l)	Flux ($mg/m^2 \cdot hr$)
2	3.4	109
4	4	64
8	8	64
16	14	56
24	17	45
240	67	18
353	89	16
1344	131	6
3153	132	3

Product/water interface area of separatory funnel=0.006793 m^2.
Volume of groundwater used = 435 cm^3.

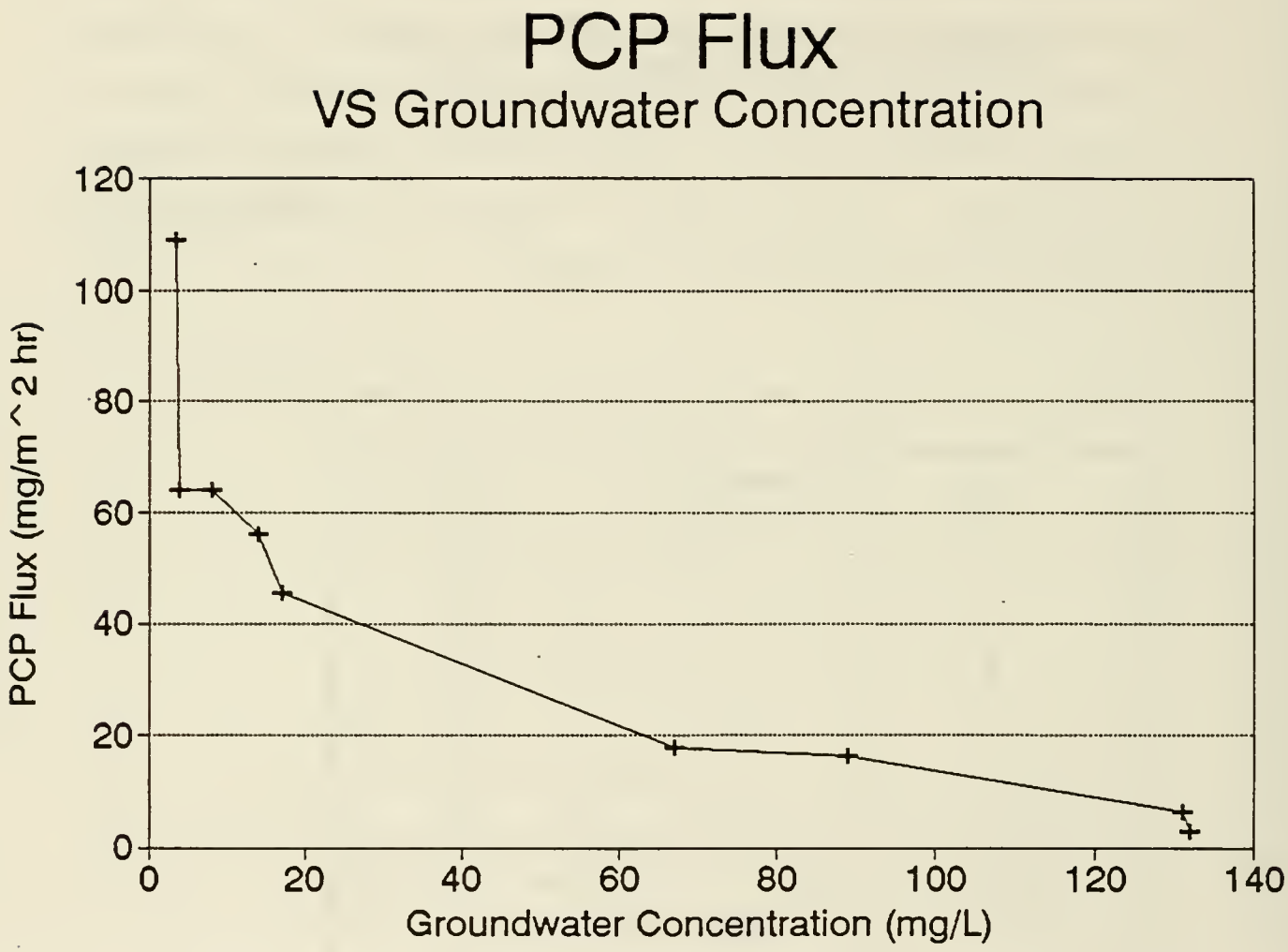


Figure 9. PCP flux versus groundwater concentration.

This flux can be used to predict the amount of PCP entering the groundwater from the diesel fuel/PCP mixture at any given initial groundwater PCP concentration. This flux does not take the groundwater velocity nor the soil attenuation into account. With the addition of groundwater velocity, the flux would tend to remain in the higher range because of the uncontaminated upgradient water that is passing under the oil. This uncontaminated groundwater would have a PCP concentration of 0 mg/L and would have a PCP flux greater than 109 $mg/m^2 \cdot hr$. Soil attenuation would make the groundwater concentrations smaller than the flux calculations would predict. This data can be use to predict an overall PCP flux from the non-aqueous phase into the both the aqueous phase and the soil.

Figure 10 shows the PCP flux verses $(c_i - c_b)$. The mass transfer coefficient (K) was determined to be 0.50 m/hr by taking a linear regression of flux verses $(c_i - c_b)$. The R^2 found was 0.75. This data shows that the mass transfer equation fits the data moderately well. The co-solvency effects were not addressed experimentally in this research, but those effects may account for some of the discrepancies in fitting an equation to the collected data.

A second approach that was used to fit an equation to the mass transfer data that was collected was by using a first-order equation:

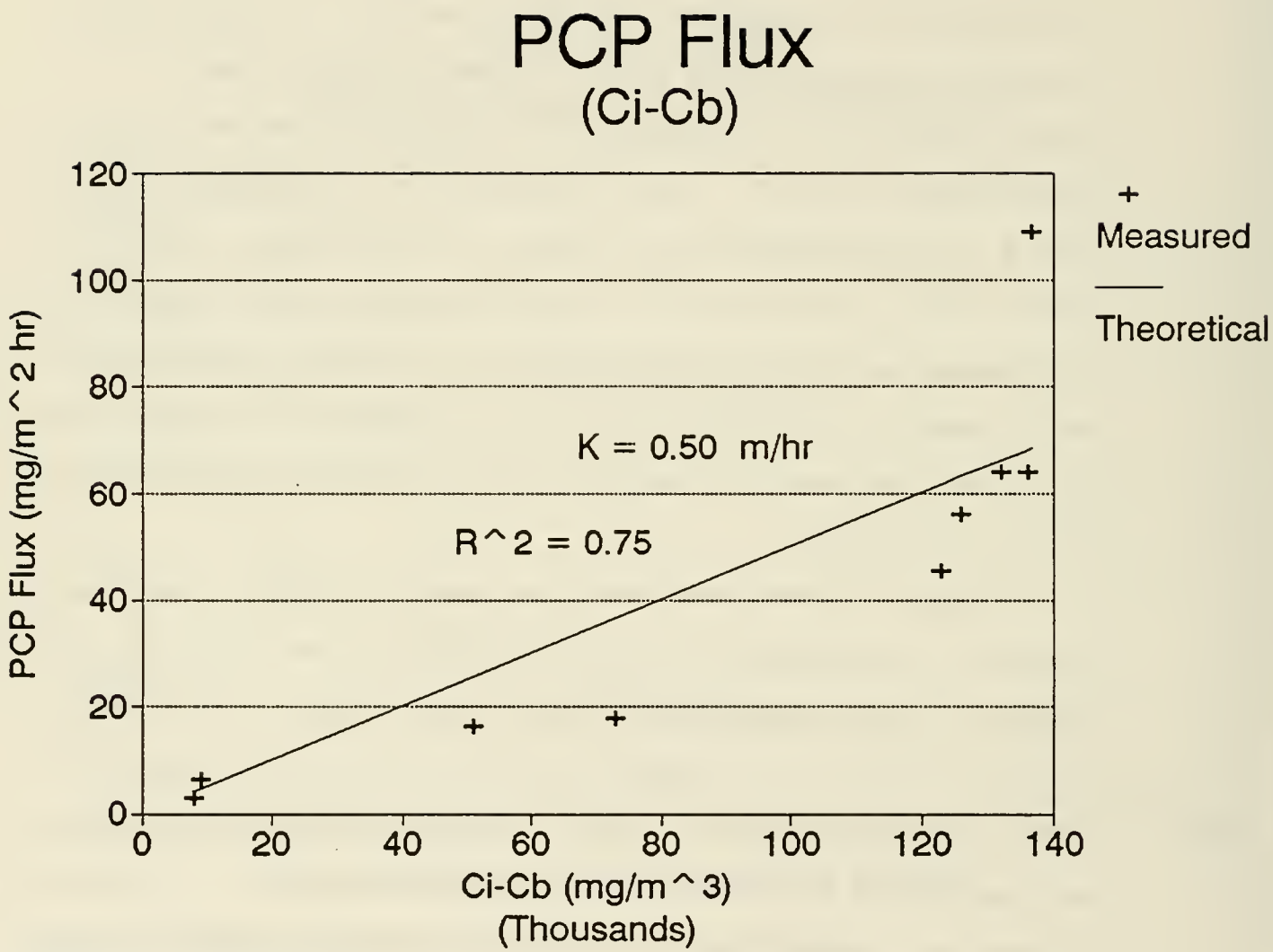


Figure 10. PCP flux.

$$-\frac{dc}{dt}=k(C_i-C_b)$$

if $C_0 = 0$:

$$C_b=C_i(1-e^{-kt}) \tag{7}$$

This equation is plotted in Figure 11. The k found was 0.0011/hr. The linear regression of $Ln(1-C_b/C_i)$ verses time had a R^2 of 0.76.

Figure 12 shows the PCP flux versus the PCP concentration found in the groundwater. This graph compares the actual sample data with the flux calculated by the mass transfer equation. The data plotted in Figure 12 can be utilized to find a PCP flux at the interface given a known groundwater concentration. Figure 13 shows the PCP concentration verses time for the actual data collected as well as the predictions from the first-order equation.

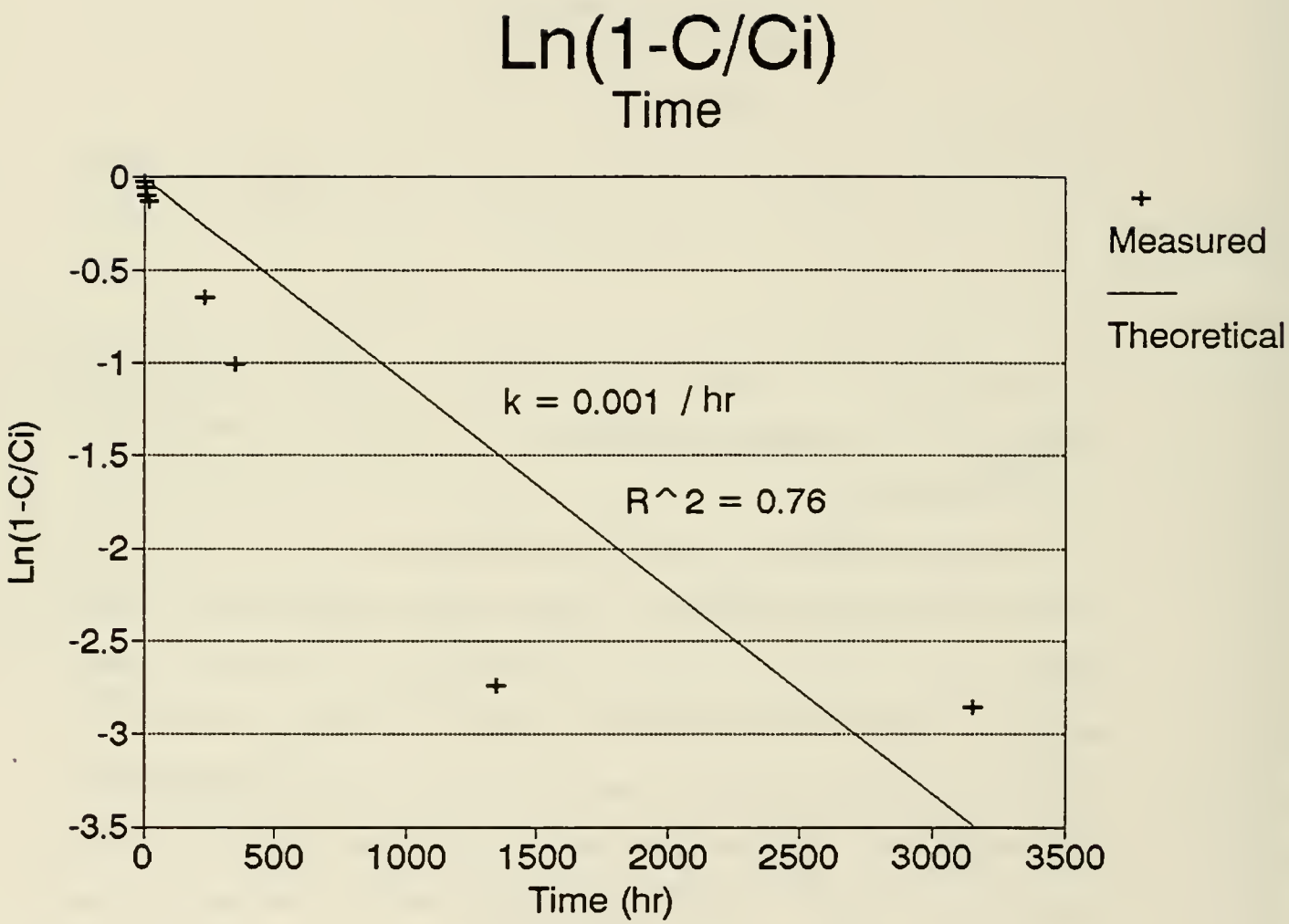


Figure 11. Ln(1-c/ci) versus time.

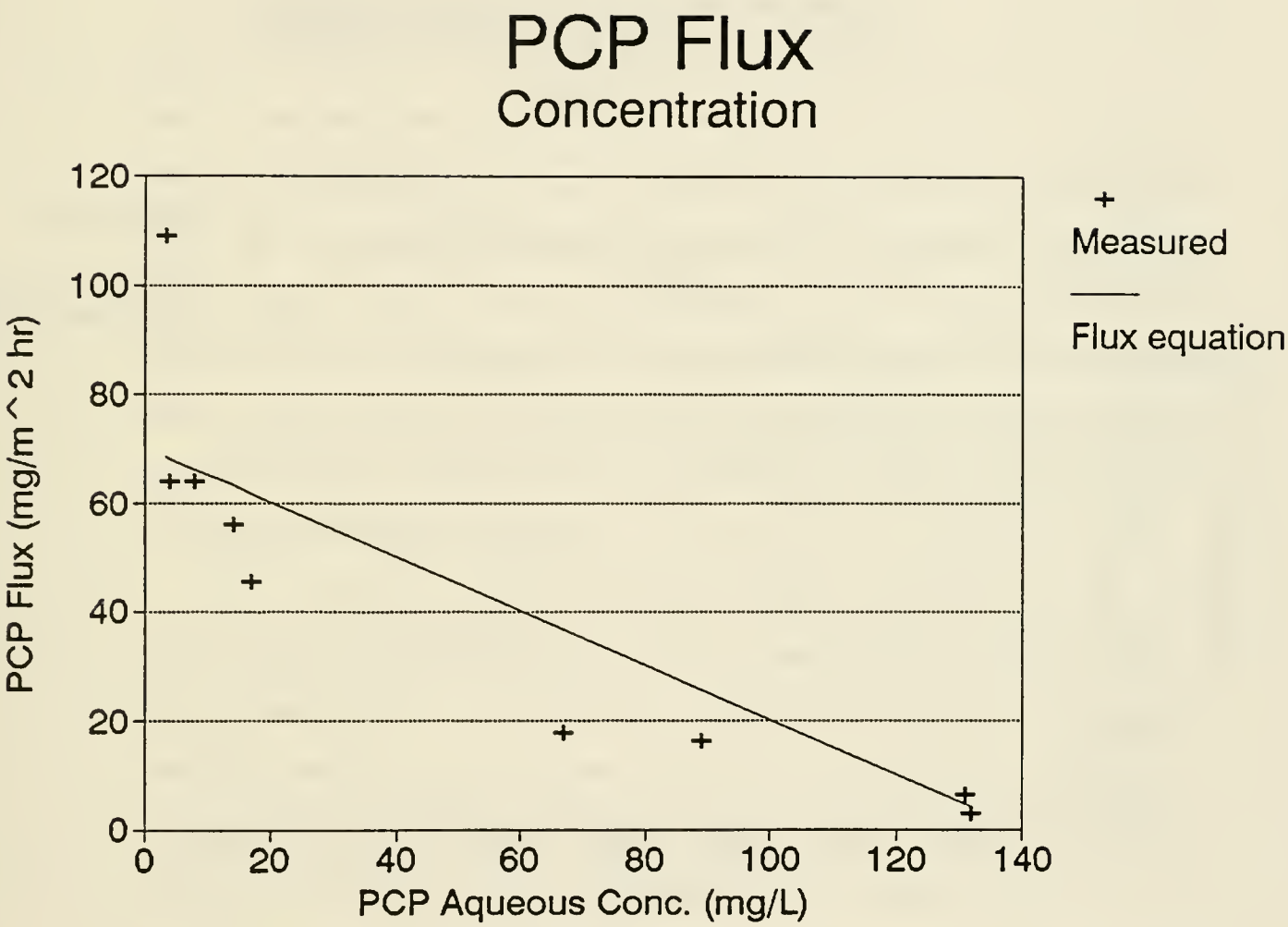


Figure 12. PCP flux versus aqueous concentration.

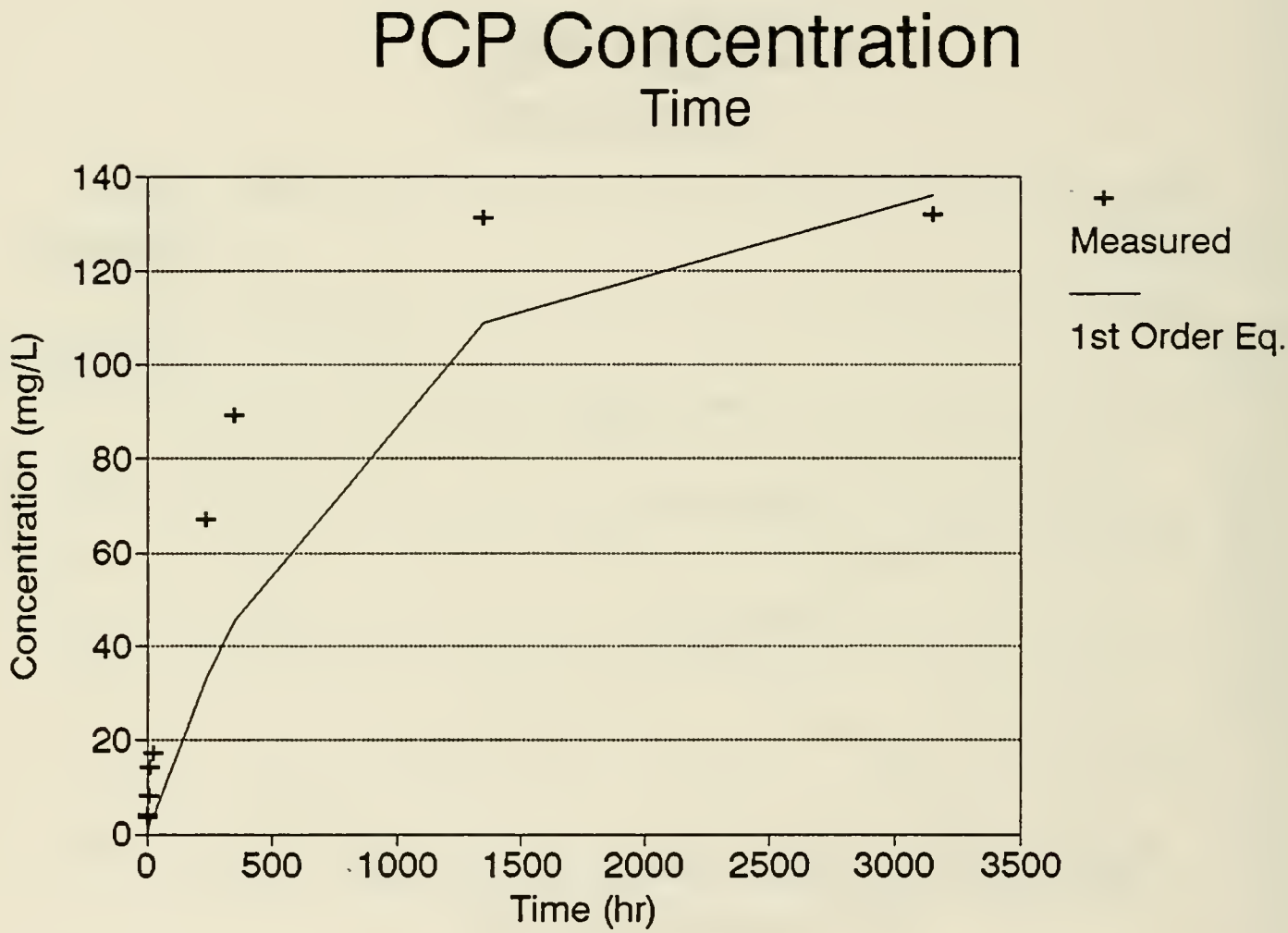


Figure 13. PCP concentration versus time.

MEASURED PCP EQUILIBRIUM CONCENTRATION

The solubility of PCP in the groundwater at the Montana Pole Plant is considerably higher than what has been published to date for the site. The PCP aqueous solubility of 14 mg/L is incorrect at the pH and temperature of the groundwater found on site. The theoretical PCP solubility at a pH of 7 and a temperature of 10°C is listed at 663 mg/L in Table 4. The apparent partition coefficient (K_{app}) that was listed in the PCP Non-aqueous/aqueous Partition Constants section of this report for a pH of 7.2 was $10^{3.32}$. The PCP concentration measured in the product at the Montana Pole Plant averaged 8050 mg/L. The K_{app} of $10^{3.32}$ would predict the PCP equilibrium concentration found in the groundwater at the product/water interface to be 3.9 mg/L.

It can be seen from the data collected that the equilibrium concentration of PCP in water has been reached at the experimental conditions. Figure 14 is a plot of the samples taken at the top one-third of the separatory funnels. This data was used to establish a theoretical equilibrium concentration of PCP at the Montana Pole Plant. The top one-third sample was used for the equilibrium value because it is near the non-aqueous/aqueous interface and, in terms of diffusion, would have a higher PCP concentration than the samples below this layer. The PCP equilibrium concentration found was 140 mg/L. This is much higher than the predicted PCP equilibrium concentration of 3.9 mg/L that was listed

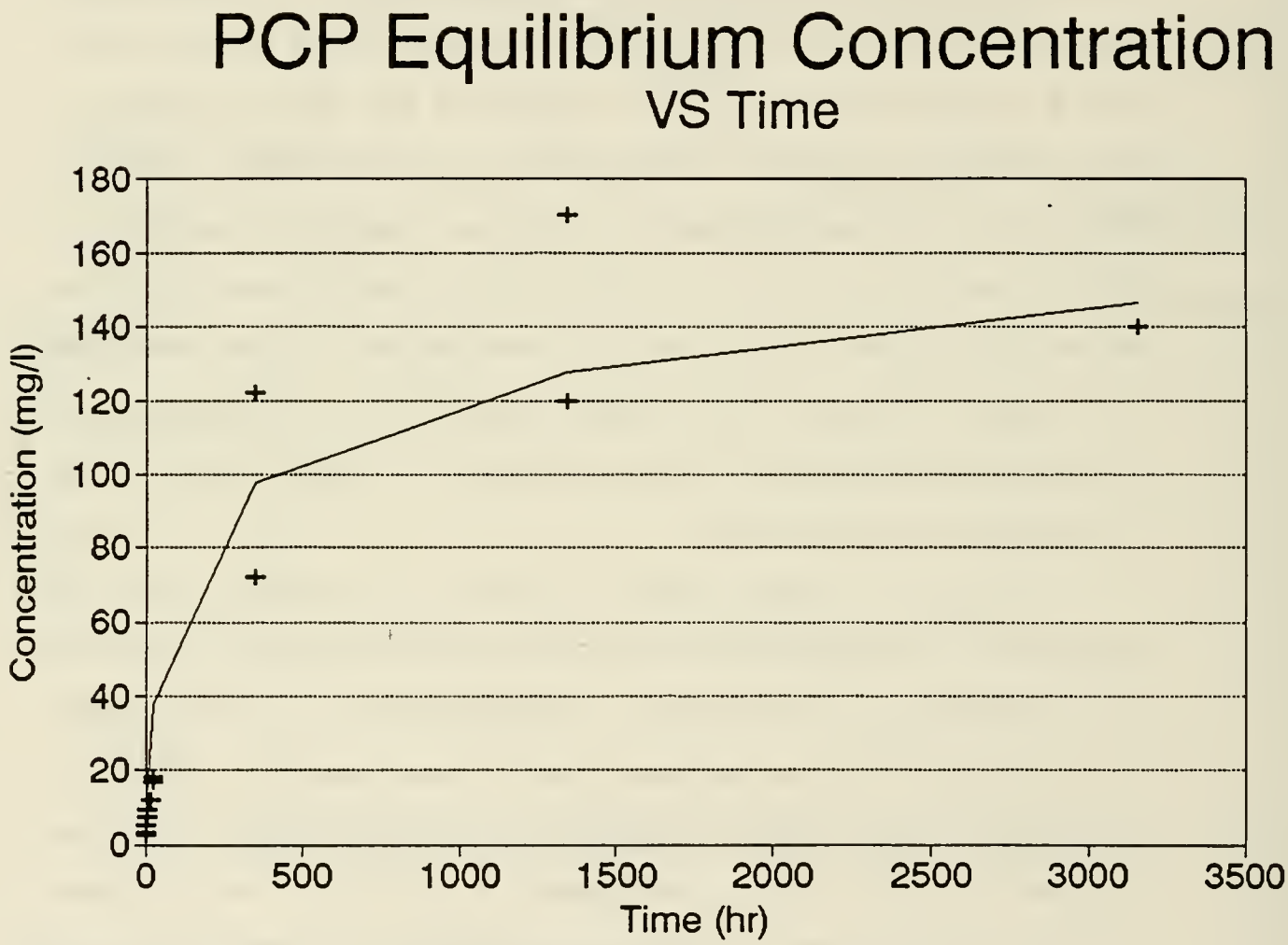


Figure 14. PCP equilibrium concentration versus time.

above. This discrepancy can be explained in a number of ways. First, the K_{app} of $10^{3.32}$ is for a PCP/octanol/water system and may not represent the floating product found at the Montana Pole Plant. Secondly, the effects of the co-solvents found in the product will have an effect on the partitioning of PCP between the product and groundwater. Finally, the analytical PCP concentration of 8050 mg/L found during this research for the product used was lower than expected. As was mentioned previously, the average product PCP concentration found by Keystone (1991) was 24,000 mg/L in well #8 and well #5. Historically, 5% PCP was reported to have been used at the site which would be 50,000 mg/L PCP. The product extraction completed by the analytical lab may have been oversaturated with PCP as was the case in other samples analyzed during this research. This is discussed later in the Error Analysis section of this report.

The K_{app} can now be calculated for the Montana Pole Plant by the equation:

$$K_{app} = \frac{[\overline{PCP}]}{[PCP]} \tag{8}$$

where:

K_{app} = the apparent partitioning coefficient between the non-aqueous and aqueous phases.

___ indicates PCP concentration in the non-aqueous phase.

With the PCP concentration in the product being 8050 mg/L and the aqueous equilibrium PCP concentration being measured at 140 mg/L, the K_{app} for the Montana Pole Plant calculates to be $10^{1.76}$. This value may be applied at the site to better estimate the PCP concentrations found at the product/water interface. Even if a product concentration of 50,000 mg/L is used, the K_{app} calculates to $10^{2.55}$ which is still a sizable difference compared to the K_{app} of $10^{3.32}$ found in the literature for PCP in an octanol/water system at a pH of 7.2.

The question of whether or not the experiment was limited by the amount of product used in the separatory funnels was also addressed. Samples MPMT056 and MPMT057 were set up with 140 ml of product instead of 20 ml as was typical for this experiment. These samples were compared to MPMT054 and MPMT055 which were run at the same time with 20 ml of PCP. These samples were tested at 240 hours. Samples MPMT056 and MPMT 057 had an average PCP concentration of 76.5 mg/L and MPMT054 and MPMT055 had a PCP concentration of 75.5 mg/L. This difference is very small considering sampling and analytical errors and so the two averages were considered equal. These results suggests that the experiments were not limited by the amount of product used in the separatory funnels. This same test for the long term samples would be beneficial to confirm the effects of product volume on the equilibrium value of PCP at the product/water interface.

The product from sample MPMT057 was analyzed for PCP

after sampling the water at 240 hours and was found to contain 7200 mg/L of PCP. With only one product sample analyzed and with the errors in analyzing high PCP concentrations, a solid conclusion cannot be made about whether the amount of product used limited the equilibrium PCP concentration.

TURBULENT INFLUENCE ON PCP MASS TRANSFER RATE

The experiments run in the first round of sampling for turbulent mass transfer of PCP confirmed that the pumping action does have an impact on the PCP concentrations found in the water. The 4 hour samples were observed to be cloudy when extracted at the end of the 4 hours and therefore were not sent to the lab for analysis. After 24 hours an oil sheen was seen on top of this extracted water which indicated that the 4 hour samples had not separated. The 24 hour samples that were extracted appeared to be clear when sampled but were observed to cloud up when acid was added as part of the analytical procedure. These samples came back at concentrations that are higher than the 24 hour quiescent samples and are shown in Table 10. The 24 hour quiescent samples had an average PCP concentration of 17 mg/L.

Table 10. Turbulent experimental PCP concentrations.

Sample ID	Description	Concentration
MPMT 006	24 Hour Shaken	34 mg/l
MPMT 007	24 Hour Shaken	35 mg/l

The results of this sampling confirm that the transfer of PCP during the pumping action is really a turbulent mixing process. The fact that an oil sheen on these two samples was observed in the analytical lab shows that either the emulsion formed during shaking had not separated after 24 hours or that the sample extract was oversaturated during the analytical procedures.

The round 5 samples were oversaturated originally and samples MPMT056 and MPMT024-1 were reported as 36 mg/L and 38 mg/L PCP respectively. These samples were reported as clouding up when the acid was added the same way that the turbulent samples were reported. After the lab was questioned and it was determined that oversaturation was occurring, the samples were re-extracted and MPMT056 was corrected to 100 mg/L and MPMT024-1 was corrected to 140 mg/L. It can be argued that the turbulent samples were actually at or near the equilibrium PCP concentration of 140 mg/L. In any case, the pumping would tend to speed up the mass transfer process and the equilibrium concentration between the product and groundwater could easily be reached.

SETTLING EFFECTS OF PCP IN WATER

The experiments testing for PCP settling in the water were carried out by analyzing the top, middle, and lower thirds of the water in the separatory funnels. These samples can be seen in Table 11. A sample number ending with 1 is the

Table 11. PCP Settling Data Collected

Sample Number	Time (hr)	Conc. (mg/l)	Sample Number	Time (hr)	Conc. (mg/l)
MPMT037-3	2	2.4	MPMT005-3	24	18
MPMT037-2	2	4.6	MPMT005-2	24	15
MPMT037-1	2	0.01	MPMT005-1	24	16
MPMT038-3	2	3.1	MPMT026-3	24	17
MPMT038-2	2	3.3	MPMT026-2	24	8.8
MPMT038-1	2	3.3	MPMT026-1	24	18
MPMT012-3	4	5.1	MPMT020-3	240	47
MPMT012-2	4	3.8	MPMT020-2	240	41
MPMT012-1	4	1.4	MPMT020-1	240	39
MPMT033-3	4	3.5	MPMT021-3	240	50
MPMT033-2	4	3.0	MPMT021-2	240	68
MPMT033-1	4	3.2	MPMT021-1	240	54
MPMT031-3	8	9.5	MPMT046-3	353	72
MPMT031-2	8	7.0	MPMT046-2	353	63
MPMT031-1	8	5.3	MPMT046-1	353	80
MPMT032-3	8	7.7	MPMT047-3	353	122
MPMT032-2	8	7.8	MPMT047-2	353	89
MPMT032-1	8	8.6	MPMT047-1	353	110
MPMT028-3	16	12	MPMT022-3	1344	170
MPMT028-2	16	5.2	MPMT022-2	1344	120
MPMT028-1	16	14	MPMT022-1	1344	160
MPMT029-3	16	12	MPMT023-3	1344	120
MPMT029-2	16	12	MPMT023-2	1344	130
MPMT029-1	16	14	MPMT023-1	1344	90
			MPMT024-3	3153	140
			MPMT024-2	3153	110
			MPMT024-1	3153	140

lower third of the water, a 2 means it was taken from the middle and a 3 means that the sample was taken from the top third of the water.

The settling of PCP in water was studied because of the 14 mg/L solubility that was cited for the Montana Pole Plant and the fact that higher than solubility PCP groundwater concentrations were recorded. With the equilibrium PCP concentration of 140 mg/L predicted by this research, it is clear that the increased PCP concentrations are primarily caused by pH and cosolvency effects and not by PCP settling in the aquifer.

A clear distinction in PCP concentrations was not observed between the layers in the separatory funnels as would be expected because of diffusion of PCP away from the product/water interface. This was most likely attributed to mixing of the layers during extraction of the water from the separatory funnels. 42% of the separatory funnels had the highest concentration in the top layer, 21% had the highest PCP concentration in the middle layer, and 37% of the funnels had the highest concentration in the bottom layer.

Future research that deals with diffusion of PCP in water should use separatory funnels that have a straight section so that the vertical distance is the same for all of the areas that are analyzed. Collecting the samples needs to be done with as little disturbance to the water as possible to keep mixing to a minimum.

QA/QC SAMPLING

The quality assurance/quality control (QA/QC) sampling performed showed that no contamination occurred in the laboratory or during transport. The rinseate samples were taken after the experiments were run and the separatory funnels cleaned according to the QA/QC procedures.

QA/QC sampling is shown in Table 12. Because only 435 ml of water was used in each separatory funnel, and the lab typically analyzes 500 ml of the water, duplicate samples could not be taken from the same funnel. In the settling experiments 145 ml of water was taken at each of the three layers for PCP analysis. These samples, being somewhat mixed upon sample collection, were used as triplicate samples to check the integrity of the lab results.

Most sample times had at least three replicate PCP samples. This was important in trying to come up with the mass transfer of PCP from the non-aqueous to the aqueous phase. It was the replicate samples that revealed the analytical problems noted in this report.

Table 12. QAQC sampling results.

Sample ID	Description	PCP Concentration
MPMT-017	Trip Blank	<0.003
MPMT-018	Bottle Blank	0.02 mg/l
MPMT-025	Rinseate Blank	<0.003
MPMT-034	Trip Blank	<0.003
MPMT-035	Bottle Blank	<0.003
MPMT-044	Rinseate Blank	0.001 mg/l
MPMT-045	Soap used in lab	<0.003
MBMG Bottle	Used to store soap	<0.003
MPMT-052	Trip Blank	<0.003
MPMT-059	Trip Blank	<0.003

CONCLUSION

The PCP flux from the product to groundwater at the Montana Pole Plant was determined experimentally and found to range from 109 $mg/m^2 \cdot hr$ at a groundwater PCP concentration of 3.4 mg/L to 3 $mg/m^2 \cdot hr$ at a groundwater concentration of 132 mg/L. A mass transfer coefficient (K) was calculated to be 0.50 m/hr for the mass transfer equation: $J = K(c_i - c_b)$. A plot of flux (J) versus $(c_i - c_b)$ was constructed to find K. The R^2 for this equation was 0.75. The experiments were performed at a pH of 7 and a temperature of 10°C.

The mass transfer data was also fit to a first-order equation and a plot of $Ln(1-c/c_i)$ versus time was made. The

rate coefficient (k) was calculated to be 0.0011 day^{-1}. This equation had a R^2 of 0.76.

Turbulent pumping effects on the mass transfer of PCP from the product to groundwater were studied experimentally by reproducing the turbulent pumping in the lab. The results showed an increase in the flux in the turbulent samples compared to the quiescent samples. Errors that occurred throughout this research by the analytical lab resulted in losing data that might have made the turbulent pumping information clearer.

The settling experiments analyzed PCP water concentrations from the top, middle, and bottom of the separatory funnels. The highest PCP concentration location was noted for each funnel. 42% of the highest readings were in the top of the funnels, 21% were in the middle, and 37 % of the highest concentrations were in the bottom section of the funnel.

With the equilibrium PCP concentration found in the experiments of 140 mg/L at the product/groundwater interface, combined with a PCP aqueous solubility of 663 mg/L at a pH of 7 and 10°C, PCP settling does not appear to be occurring in the groundwater. The PCP solubility data that has been used at the Montana Pole Plant is 14 mg/L. The literature that was found on PCP solubilities was pieced together and fit to an equation to give theoretical PCP solubilities at various pH and temperature ranges. The 14 mg/L solubility of PCP that is

being used appears to be the solubility at the pKa (4.74) and at 20°C. The PCP solubilities calculated range from 2.3 mg/L at a pH of 2 and 0°C to 26541 mg/L at a pH of 8.5 and 15°C. At higher pH's the solubility will keep increasing because it is a function of pH. The PCP solubility calculated at a pH of 7 and a temperature of 10°C was 663 mg/L. Future studies should use a PCP solubility at the given pH and temperature of the groundwater at the Montana Pole Plant.

The equilibrium PCP concentration found for the Montana Pole Plant was 140 mg/L. With a starting PCP concentration of 8050 mg/L in the product the apparent partitioning coefficient (K_{app}) is $10^{1.76}$. The product concentration reported by the analytical lab may be low because of the analytical problems discussed previously. The actual K_{app} for the Montana Pole Plant may be higher.

RECOMMENDATIONS

This report dealt with a complex product mixture to come up with the mass transfer rate of PCP from the product to the groundwater. More research is needed to address the cosolvent effects on PCP solubility and mass transfer. A study utilizing various simpler PCP/organic mixtures would help to show the impact of cosolvents on the solubility and mass transfer. A study proving the effects of pH on PCP solubility would be beneficial as well.

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